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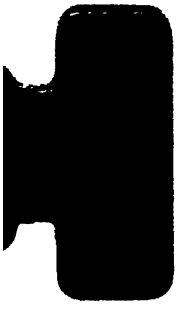

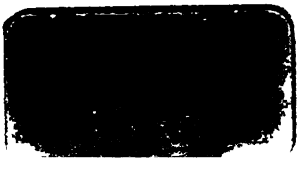

TRANSACTIONS OF THE

SECTION ON

Preventive Medicine and Public Health

of the
American Medical Association
at the Sixty-First Annual
Session, held at St. Louis,
Mo., June 7 to 10, 1910

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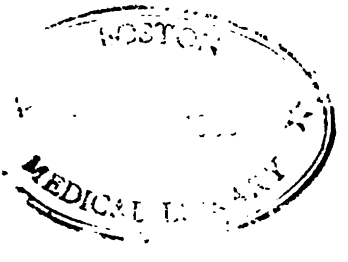

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LIST OF OFFICERS

Those named below have served as officers in this section. This branch of the practice of medicine has been included with other subjects in the earlier years, as will be seen by the headings which denote the different names given to the section. The names of the officers have been taken from the published records which are deficient in some cases. It will be appreciated if any additional data are brought to the attention of the Secretary of the American Medical Association.

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1865 Chairman, Dr. J. F. Hibberd, Richmond, Ind.
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1868 Record wanting.
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1871 Record wanting.
1872 Chairman, S. C. Busey, Washington, D. C.
Secretary, S. L. Howard, Maryland.

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1878 Chairman, J. S. Billings.
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1883 Chairman, D. J. Roberts, Nashville, Tenn.
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1887 Chairman, H. B. Baker, Lansing, Mich.
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1892 Chairman, C. A. Lindsley, New Haven, Conn.
Secretary, S. P. Duffield, Detroit.
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Secretary, H. M. Bracken, Minneapolis.
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1902 Chairman, H. M. Bracken, Minneapolis.
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1907 Chairman, William C. Gorgas, Ancon, Canal Zone.
Secretary, S. T. Armstrong, New York City.
Delegate, N. K. Foster, Sacramento.
1908 Chairman, Joseph H. White, New Orleans.
Secretary, S. T. Armstrong, New York City.
Delegate, Clarence L. Wheaton, Chicago.

SECTION ON PREVENTIVE MEDICINE AND PUBLIC HEALTH

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Delegate, J. H. White, New Orleans.
1910 Chairman, W. A. Evans, Chicago.
Vice-Chairman, Marshall Langton Price, Baltimore.
Secretary, C. Hampson Jones, Baltimore.

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PROCEEDINGS OF THE SESSION

TUESDAY, JUNE 7—AFTERNOON

The Section was called to order at 2 p. m., in Association Hall, by the Chairman, Dr. J. N. Hurty, Indianapolis.

The Chairman read his address on "The Bookkeeping of Humanity." On motion of Dr. P. M. Townsend, Marshalltown, Iowa, duly seconded, the paper was referred to a committee of three, appointed by the Secretary, Dr. Marshall L. Price, Baltimore (temporarily acting as chairman), as follows: Dr. W. R. Batt, Harrisburg, Pa.; Dr. C. H. Jones, Baltimore, and Dr. P. M. Townsend, Marshalltown, Iowa. Discussed by Drs. Prince A. Morrow, New York; W. F. Snow, Sacramento, Cal.; Arthur Reynolds, Chicago; P. M. Townsend, Marshalltown, Iowa; Henry B. Hemenway, Evanston, Ill., and J. N. Hurty, Indianapolis.

Dr. Walter P. Bierring, Iowa City, Iowa, read a paper on "The Rôle of Pathology and Physiology in Preventive Medicine."

Dr. Joseph P. Remington, Philadelphia, read a paper on "The Rôle of Pharmacy in Preventive Medicine."

These two papers were discussed by Drs. Seneca Egbert, Philadelphia, and William Le Roy Dunn, Asheville, N. C.; W. A. Evans, Chicago; Liston H. Montgomery, Chicago; J. N. Hurty, Indianapolis; George Edward Fell, Buffalo, N. Y.; Walter P. Bierring, Iowa City, Iowa, and Joseph P. Remington, Philadelphia.

Dr. G. Lloyd Magruder, Washington, D. C., read a paper entitled "Further Observations on the Milk-Supply of Washington, D. C.," with illustrative lantern slides. Discussed by Drs. William C. Woodward, Washington, D. C.; William H. Welch, Baltimore; B. Franklin Royer, Harrisburg, Pa.; William Edward Grant, Louisville, Ky.; Seneca Egbert, Philadelphia. A vote of thanks to the author of the paper, Dr. Magruder, was moved by Dr. W. Forrest Dutton, Carnegie, Pa., and given.

The Secretary, on behalf of the officers of the Section, then nominated for associate membership in the American Medical Association John M. Glenn of New York, director of the Russell Sage Foundation. The report was adopted, and the nomination referred to the House of Delegates.

WEDNESDAY, JUNE 8—MORNING

Dr. Henry B. Hemenway, Evanston, Ill., offered the following resolution:

According to the published reports of the Census Bureau there has been a great and marked increase in the number of suicides in this country. The death-rate from this cause per hundred thousand was as follows: 1902, 12.7; 1903, 13.9; 1904, 14.8; 1905, 16.1; 1906, 14.3; 1907, 16.2; 1908, 18.5. An increase of practically 50 per cent. in the seven years demands investigation and energetic action. The publication in the secular papers of these unfortunate occurrences can do no one good; on the other hand, it is well recognized by those in a position to judge that such publication has a powerful suggestive effect on susceptible individuals, and it is unquestionably one of the most active causes of this form of death; therefore, be it

Resolved, That such publication of accounts of suicides is detrimental to the good of the people in this country, and that we request the House of Delegates to take action in the case by requesting the press of the land to stop such publication; and, further, that the Legislative Committee be instructed to further the enactment of a national law forbidding the use of the mails by any paper making such publication; and, further, that the same committee be instructed to assist in the passage of state laws making such publication a misdemeanor and providing suitable punishment therefor.

This resolution was approved by the Section for submission to the House of Delegates. [The House adopted a substitute of similar import. THE JOURNAL, June 18, page 2076.]

The Chairman appointed as a Committee on Nominations Drs. W. Forrest Dutton, Carnegie, Pa.; T. R. Crowder, Chicago, and J. E. King, Richmond, Ind.

Dr. Wilmer R. Batt, Harrisburg, Pa., on behalf of the committee to which the Chairman's address was referred, recommended its early publication and wide distribution.

The Chairman explained that he had not, in the session of June 7, 1910, given Dr. G. Lloyd Magruder opportunity to make the final statement in regard to the latter's paper, "Further Observations on the Milk-Supply of Washington, D. C.; Dr. Magruder then spoke.

Dr. Seneca Egbert, Philadelphia, read the Oration on State Medicine and Hygiene. Discussed by Drs. Henry B. Hemenway, Evanston, Ill.; W. A. Evans, Chicago; Rosalie Slaughter Morton, New York; Arthur Reynolds, Chicago; William C. Woodward, Washington, D. C.; John H. White, New Orleans; Mazyck P. Ravenel, Madison, Wis. Dr. Marshall Langton Price, Baltimore, moved a vote of thanks to Dr. Egbert, which was given.

Dr. Henry B. Hemenway, Evanston, Ill., offered the following resolution:

WHEREAS: Public health administration is greatly helped by popular education and cannot advance far beyond the state of common knowledge; and

WHEREAS: Our literary colleges and normal schools to-day give practically no instruction of this kind; and

WHEREAS: Much of the instruction in the graded schools of the land is based on misinformation; therefore be it

Resolved, That such instruction by lectures or otherwise should be given in every such institution of learning, and

Resolved, That the House of Delegates be asked to appoint a committee to promote a course of instruction in all literary colleges and normal schools.

This was adopted for submission to the House of Delegates [which referred it to the newly-formed Council on Health and Public Instruction. THE JOURNAL, June 18, page 2076.]

Dr. Joseph Collins, New York, read a paper on "The Epidemiology of Poliomyelitis and Cerebrospinal Meningitis." Discussed by J. N. Hurty, Indianapolis.

Dr. Hiram Woods, Baltimore, read a paper on "The Rôle of Ophthalmology in Preventive Medicine. Discussed by Drs. Leartus Connor, Detroit; Prince A. Morrow, New York; Seneca Egbert, Philadelphia; Henry B. Hemenway, Evanston, Ill.; W. Forrest Dutton, Carnegie, Pa.; and Hiram Woods, Baltimore.

Dr. Thomas S. Southworth, New York read a paper on "The Rôle of Pediatrics in Preventive Medicine." No discussion.

WEDNESDAY, JUNE 8—MORNING

The following papers were read and discussed as a symposium on Hookworm and Pellagra:

Dr. John D. Long, Washington, D. C.: "Pellagra," illustrated by lantern slides.

Dr. Charles W. Stiles, Washington, D. C.: "Sanitary Phases of the Hookworm Problem," illustrated by lantern slides,

Dr. Allen W. Freeman, Richmond, Va.: "Hookworm Disease: The Farm; the Next Point of Attack in Sanitary Progress."

These three papers were discussed by Drs. Marshall Langton Price, Baltimore; John L. Jelks, Memphis, Tenn.; C. C. Bass, New Orleans; James W. Babcock, Columbia, S. C.; William L. Medling, Nashville, Tenn.; Seneca Egbert, Philadelphia; John D. Long, Washington, D. C.; Charles W. Stiles, Washington, D. C.; J. N. Hurty, Indianapolis, Ind., and Allen W. Freeman, Richmond, Va.

Dr. W. Forrest Dutton, Carnegie, Pa., read a paper on "Present-Day Problems and Progress in Prevention of Typhoid Fever,"

Dr. George Edward Fell, Buffalo, N. Y., read a paper on "The Currents at the Eastern End of Lake Erie and the Head of Niagara River: Their Influence on the Sanitation of the City of Buffalo, N. Y.," illustrated with lantern slides.

These two papers were discussed by Drs. H. W. Hill, Minneapolis; C. Hampson Jones, Baltimore; Liston H. Montgomery, Chicago; W. Forrest Dutton, Carnegie, Pa., and Seneca Egbert, Philadelphia.

Resolutions on typhoid were adopted and referred to the House of Delegates for action.

Dr. I. D. Rawlings, Chicago, read a paper on "The Campaign Against Diphtheria and Scarlet Fever in Chicago."

Dr. C. Hampson Jones, Baltimore, read a paper on "What Can Health Departments Do to Control Scarlet Fever?"

These two papers were discussed by Drs. Henry B. Hemenway, Evanston, Ill.; B. Franklin Royer, Harrisburg, Pa.; H. W. Hill, Minneapolis; Seneca Egbert, Philadelphia; R. M. Winn, Hannibal, Mo.; G. Koehler, Chicago; H. Delamater, Kansas City, Mo.; I. D. Rawlings, Chicago, and C. Hampson Jones, Baltimore.

By motion duly made and carried, Papers 15 and 16 were made the first order of business for the ensuing meeting.

Thursday, June 9—Morning

Dr. T. D. Crothers, Hartford, Conn., read a paper on "The Relation of Alcoholism and Drug Addictions to Preventive Medicine." Discussed by Drs. Liston H. Montgomery, Chicago, and J. N. Hurty, Indianapolis.

Dr. W. Forrest Dutton, Carnegie, Pa., Chairman of Committee on Nominations, submitted the following nominations: Chairman, Dr. W. A. Evans, Chicago; Vice-Chairman, Dr. Marshall Langton Price, Baltimore; Secretary, Dr. C. Hampson Jones, Baltimore, Md.; Delegate, Dr. J. N. Hurty, Indianapolis; Alternate, Dr. J. H. White, New Orleans. The Secretary was instructed to cast the ballot for these nominees, and they were declared elected.

Dr. Arthur Reynolds moved the nomination of Dr. W. A. Evans, Chicago, as Orator on State Medicine and Hygiene, which was seconded, and Dr. Evans was elected, and made a stirring speech foreshadowing the creation of a Council on Public Health, whose function should largely be the coordination of work now done nation-wide in the interests of public health.

Dr. W. C. Gorgas, Ancon, Canal Zone, declared his sympathy with the Chairman-Elect's program for widening the scope of the Section.

Dr. Arthur Reynolds, Chicago, moved "That the Chairman of this Section be empowered to appoint such committees as in

his judgment seem wise, to carry out the purposes he has outlined." Seconded and carried.

Dr. Miles F. Porter, Fort Wayne, Ind., read a paper on "The Rôle of Surgery in Preventive Medicine." Discussed by Drs. J. N. Hurty, Indianapolis; Seneca Egbert, Philadelphia; Liston H. Montgomery, Chicago; H. W. Hill, Minneapolis, and Walter P. Manton, Detroit.

Dr. Walter P. Manton, Detroit, read a paper on "The Rôle of Obstetrics in Preventive Medicine." Discussed by Drs. J. N. Hurty, Indianapolis; Henry B. Hemenway, Evanston, Ill.; P. M. Townsend, Marshalltown, Iowa; Charles W. Stiles, Washington, D. C.; C. Hampson Jones, Baltimore; Seneca Egbert, Philadelphia, and Walter P. Manton, Detroit.

Dr. J. J. Kyle, Indianapolis, read a paper on "The Rôle of Rhinology and Otology in Preventive Medicine." Discussed by Drs. Robert Levi, Denver; J. D. MacLaren, Norman, Okla.; H. W. Hill, Minneapolis; Liston H. Montgomery, Chicago; William H. Rush, St. Louis, and J. J. Kyle, Indianapolis.

Dr. Hibbert W. Hill, Minneapolis, read a paper on "Acute Epidemic Anterior Poliomyelitis." Discussed by Drs. J. M. Allen, Liberty, Mo.; Hibbert W. Hill, Minneapolis; W. Forrest Dutton, Carnegie, Pa.; Julius Lingenfelder, West Point, Neb., and Seneca Egbert, Philadelphia.

Dr. W. H. Rennie, Washington, D. C., read a paper on "The Relation of Recruiting to Preventive Medicine." Discussed by Drs. Marshall Langton Price, Baltimore, and J. N. Hurty, Indianapolis.

Dr. Henry B. Hemenway, Evanston, Ill., read a paper on "Legal Aspects of Domestic Quarantine." Discussed by Drs. John H. White, New Orleans; B. Franklin Royer, Harrisburg, Pa.; W. A. Evans, Chicago; W. F. Snow, Sacramento, Cal., and Henry B. Hemenway, Evanston, Ill.

The Chairman, with assent of the Section, arranged to send a telegram of sympathy and regret to Dr. H. M. Bracken, Minneapolis, who was reported to be ill with typhoid fever.

Thursday, June 9—Afternoon

Dr. Hyman Cohen, Chicago, read a paper on "House Quarantine." Discussed by Drs. B. Franklin Royer, Harrisburg, Pa.; Seneca Egbert, Philadelphia; I. D. Rawlings, Chicago, and Hyman Cohen, Chicago.

A paper by Dr. John H. White, New Orleans, on "The Permanent Elimination of Yellow Fever from the Earth," was read by Dr. Henry B. Hemenway, Evanston, Ill. No discussion.

Dr. Charles W. Stiles, Washington, D. C., exhibited two models of privies, describing details of construction and choice of color of paint to be applied, stating that flies were attracted by light colors, mosquitoes by dark colors; and further, that he had succeeded in placing privy construction on the manual training curricula of some schools. Discussed by Drs. J. N. Hurty, Indianapolis; Seneca Egbert, Philadelphia, and H. W. Hill, Minneapolis.

Dr. D. T. Quigley, North Platte, Neb., read a paper on "The Work of Prevention in Nebraska." No discussion.

Dr. W. A. Evans, Chicago, read a paper on "The Ventilation of School Buildings." Discussed by Drs. Henry B. Hemenway, Evanston, Ill.; Seneca Egbert, Philadelphia; J. N. Hurty, Indianapolis, and W. A. Evans, Chicago.

Dr. Gottfried Koehler, Chicago, read a paper by himself and Dr. C. S. Clair Drake, Chicago, on "The Prevention of Infant Mortality." No discussion.

Dr. Fred O. Tonney, Chicago, read a paper on "Tuberculosis in the Raw Milk-Supply of Chicago." Discussed by Drs. W. A. Evans, Chicago, and Fred O. Tonney, Chicago.

Dr. B. L. Arms, Boston, read a paper on "The Strauss Reaction for the Diagnosis of Glanders." Discussed by Drs. H. W. Hill, Minneapolis, and B. L. Arms, Boston.

Installation of the officers-elect then followed, and the Section adjourned for 1910.

THE BOOKKEEPING OF HUMANITY

CHAIRMAN'S ADDRESS

J. N. HURTY, Phar.D., M.D.
Secretary Indiana State Board of Health
INDIANAPOLIS

The accurate collection, tabulation and analysis of records of births, still-births, deaths, marriages, divorces, and sickness may be said to constitute the bookkeeping of humanity. The bookkeeping of dollars is very important, but of far greater importance is the bookkeeping of those events in the lives of human beings which are fundamental to an understanding of the movements of mankind, and which are also fundamental to the practical application of hygiene, to secure higher efficiency, longer duration of life and fuller measure of happiness.

Without vital statistics, a nation cannot know its vital latitude and longitude, its national time of day on the great ocean of time. Through vital statistics a nation is able to know its temperature and pulse, and follow and understand other vital functions. Or, again, its vital potentialities are reflected and comprehensively expressed in such statistics.

To live a successful life, a man must notice the symptoms which forecast his demise, that he may take action to neutralize them or to prepare for his end; and so should a nation carefully collect and keep such checks and balances that tell of increase or decrease in numbers, and causes affecting the same, and which tell the status of social conditions, so that the question of living

or dying may be rationally considered. We have this illustrated in the case of France, where lately vital statistics disclosed the fact that the death-rate exceeded the birth-rate, thus forecasting, if the conditions continued, the demise of a great nation.

Human life in its beginning, its duration and ending, is the predominant consideration in all personal, social, state and national problems. The standing of a nation is finally to be measured by the standard of human lives. No thoughtful person denies these facts. Yet, what a surprise it is, yes, a shock, to remember that we ignore in great degree these important matters. We do not fail to keep records of all legal procedures, of all commercial transactions, no matter how insignificant; we will deny ourselves needed rest and sleep to record a little or big real estate deal; we will keep careful minutes of a town meeting or of a social club; yet in many states a human being, made in the image of God and endowed with an immortal soul, can be born and can die without any public and frequently no private record of the fact. However, it is not so with animals and plants. For them, elaborate systems record their birth, entire career and death. Every pedigreed calf, colt, dog, rooster, ram, and even cat, has its birth and death recorded; yet children, our hostages to fortune are born, and fathers and mothers die, without record. The National Government at the cost of millions annually maintains a Bureau of Animal Industry which looks after hog cholera, Texas fever and sheep rot, keeping accurate statistics; it also maintains at a cost of millions annually a Department of Agriculture, which collects crop statistics, beef, pork, poultry and mule statistics, but in not a single place in the whole country do we so accurately know the number of cases of diphtheria and the deaths from this cause among our babies. These conditions make one ask, "Is civilization a failure or has the Caucasian played out?"

IMPORTANCE OF VITAL STATISTICS TO THE INDIVIDUAL

Besides the general importance of vital statistics to a nation as a nation, they also have an importance of the greatest moment to the individual. For instance, by vital statistics must be determined the right to attend school, to enter certain occupations, to vote, to marry, to hold or to dispose of property, to employment by the state or country in military or civil service; responsibility for crime or misdemeanor; exemption from military or jury duty; qualifications or disqualifications for certain public offices; and privileges and immunities of a public nature; also private contracts in great variety, as in insurance and partnership. Indeed, there is hardly a relation from the cradle to the grave in which the evidence furnished by accurate vital statistics may not prove of the greatest individual and general, social or governmental value. The two great important events in the lives of men are birth and death; the alpha and omega, the beginning and the end. For a state not to make these events of accurate record for each individual is to neglect to keep abreast of practical civilization; yes, to be really civilized.

SANITARY VALUE OF VITAL STATISTICS

The public and individual value of vital statistics has been briefly set forth, but after all, their sanitary value is of greater importance. The value of the practical application to every-day life of the ounce of prevention, will hardly be disputed; and surely the prevention of disease constitutes the very crown of scientific medicine. The connection between the accurate registration of the existence of infectious diseases, of all deaths and the causes of death, and the practical prevention of disease, seems to be apparent. Whatever throws light on the causes of sickness and death, or whatever hastens or retards marriages or increases or decreases the number of births, must be helpful, yes, vitally necessary; but to be so, must have numerical treatment.

Plainly, the capable health officer must have vital statistics at hand to be efficient in instituting such measures as are reasonable and necessary to prevent disease. The general must know the position, numbers, equipment and character of his enemy in order to carry on a successful battle. So for a successful fight the hygienist must have a like knowledge of his enemy.

EDUCATIONAL VALUE OF VITAL STATISTICS

Then there is the educational value of vital statistics. Need this point be dwelt on? Is it required to show how the relative destructiveness of the various diseases, the death-rates and sickness-rates from them, would educate the people to the necessity of action? The fact that the number of deaths from tuberculosis leads all the rest, the fact that pneumonia is the next greatest cause of death, and other life facts, are surely of the highest educational value. To convince and lead to action the keepers of the public purse so that the state can do her part in disease-prevention, vital statistics are absolutely essential. Surely, sanitary administration will be defective where vital statistics are wanting, and it will be efficient where they are accurate and complete. Low ideals of cleanliness and of health, accompanied by low ideals of morals, will exist to a greater degree where vital statistics are ignored than where they are accurately collected. Immediate records of births and deaths should be made, because experience teaches that an accurate record in all cases cannot or will not be secured unless reports are made forthwith and at once. The fact which should be given on birth and death certificates are now pretty well determined, and to the practitioner of medicine alone belongs the highly important duty, and also the privilege in cases of death, to render a correct statement of cause of death. The science of medicine, in the person of the medical atten-

dant, is the only possible source of this knowledge which is fraught with such great importance to the family of the dead, to society at large and to medical science.

REPORTING INFECTIOUS DISEASES

Every parent naturally wishes to protect his household against disease, just as he would protect against the rending of wolves or the sting of serpents. To have this protection, the aid of the physician is necessary, and gladly should the aid be given. When the infection of scarlet fever or other transmissible disease appears in a household, it is indeed wicked for any person possessing the information not to lend his most efficient help to prevent its extension. A physician negligent in reporting an infectious disease which comes under his care, or negligent in warning and instructing the family in regard to the preventing of transmission to others, is an enemy to society, an enemy to himself and an enemy to the profession of medicine. More, he is a dangerous member of society and should be hunted down and brought to book as would a poisoner of wells, the assassin, or the incendiary. In reporting an infectious disease, that proper measures for control may be instituted, the physician not only renders a service to society, for which society might well pay, but he also renders help to his neighbors, he helps himself, he performs a Christian duty, he performs a service to scientific medicine and fulfills his Hippocratic oath.

If the patron asks a physician not to make public the fact that an infectious disease exists in his house that he may not be troubled with placard and quarantine, let the physician kindly and firmly, with proper exposition of the law and with gentle reminder of the Golden Rule, give his absolute refusal. Let not the representative of the noble and learned profession of medicine for one instant enter into even the shadow of an act which is contrary to the statutory law and which opposes that

divine rule of action, "Do unto others as you would have them do unto you."

As to compensation for service in reporting infectious diseases: The public can well afford to give compensation but in case it does not, still the duty of reporting and the honor of fulfilling the duty remain with the physician. We often hear quoted the clause of the Constitution which says in effect that all services rendered to the state shall be paid for; but let us look into this proposition. If required to return many data the physician should certainly be paid therefor, but for the return of the simple fact of the existence and location of an infectious disease, he is not altogether entitled to pay nor should he ask it. The right of the government to require that the physician be licensed need not be argued: the license system is desired by the profession. But what is a license? As regards infectious diseases the license is clearly granted to deal with this class of cases on the tacit understanding, first, that he has the diagnostic ability to recognize these cases when he sees them; second, that he will promptly give the state the benefit of his special knowledge.

The special duty of reporting infectious diseases, is, therefore, imposed when a license to practice medicine is asked for and granted. It has been argued in courts that the payment of fees for reporting the presence of infection would be as contrary to a proper public policy as to give fees for reporting a fire or for reporting a theft clearly seen in operation.

VALUE OF VITAL STATISTICS TO MEDICAL SCIENCE

Medical science, like all other sciences, must, for its development, have coordination of the facts, and numerical expression must be given. In the numerical relations of recoveries to deaths in the numerical relations of the destructiveness of the various diseases, in the numerical relation of diseases and deaths compared with various age periods, in the numerical relations of

sex, nationality, social condition and occupations and employments, scientific medicine finds much valuable material for her advancement. All of these relations and also other facts are supplied by vital statistics. Every true physician is in love with his profession; he would have it make all advancement possible and will always lend his aid and services to such end.

It follows then, that for the science he has adopted for his life work, if not in the service of his patients and if not in the service of society, he will gladly and eagerly contribute his part to vital statistics.

ACTUAL INSTANCES

Two actual instances showing the responsibility of physician to family in the matter of reporting births will probably serve a good purpose. A young man and wife came from Switzerland to Indiana. They were hardy, honest, and industrious, the very kind of people needed to make a nation. They settled in Switzerland County, probably being attracted by the name. In time a child, a girl, was born to them. The father was thrifty and intelligent and within three years became a foreman in a saw-mill. When his child was about two years old the father was accidently killed by a log rolling over him. Time had not been sufficient for him to accumulate property. So the wife struggled with wash-tub and needle to support herself and child. One day the news came that a brother of the father, the child's uncle in Switzerland, had left $12,000 to the issue of his brother. Great was the rejoicing, which on account of the neglect of a physician to record the birth, was to become bitter sorrow. Before the Swiss government would turn over the property it must have proof that the little child was the issue of the dead man. As said, the physician had made no record and now he was dead. Neighbors know of the birth of the child but could not testify except as to their belief of the fatherhood. The testimony of the mother was not admissible in her own coun-

try for she could lead any child into court and declare any man to be its father. It was the physician's birth certificate made at the time of birth and presumably in the presence and by the authority of the father, that the law demanded. It could not be produced, and the helpless infant whom the physician should have been eager and happy to protect and serve, lost its inheritance. What a cruel and unnecessary blow was this, from the hand of a practitioner of the learned and benevolent science of medicine! Surely, a physician's duty to the families he serves and to the helpless infants he pilots into this world, are not fully performed until he has made out a certificate of birth and taken reasonable care that it is made of due legal record.

Another incident. Farmer Hadley, of Indiana, dying, left his valuable farm in trust to his unthrifty son, to go to his granddaughter on her twenty-first birthday. The girl had been told the date of her birth and always celebrated as her birthday the annual recurrence of the same. However, when she claimed she was twenty-one, and then claimed her inheritance, her father denied her age, saying she was only nineteen. The family Bible was appealed to, but the leaf with the family record was gone. No birth record had been rendered, and the attending physician was dead. The court was in a quandary. A Solomon was needed for judgment. At last a neighbor remembered that a valuable cow belonging to the grandfather had given birth to a calf on the day the girl was born, and he could swear to it. Perhaps the grandfather had recorded the date of the birth of the calf. His farm books showed this to be the case. The date of the birth of the human being was established.

SUMMARY—CONCLUSIONS

The importance of vital statistics to the family, to the state, and to medicine, can hardly be overestimated. The physician, the representative of the science of medicine, is, except in instances, the only member of society

who can supply information in regard to causes of deaths and the presence of infectious diseases. As it is of very great importance to the family that its births, deaths, and cases of infectious diseases be legally recorded, and as the family presumably pays for the physician's services, the physician, therefore, should not consider his services fully performed nor that he is entitled to his fee until the certificates which are of such great importance are duly made. And again, the physician should remember when reporting vital statistics, that he is giving obedience to the statutes of his state, on which he depends for protection; that he is protecting the helpless; that he is doing a general good, and that he is serving the science of medicine.

ABSTRACT OF DISCUSSION

DR. PRINCE A. MORROW, New York: The subject is one of the most important ever brought before this Section. Attention should be called, however, to the fact that there is a large and important class of diseases which are infectious, and dangerous to the public health, but which are practically ignored in our system of vital statistics.

In few of our vital statistics is there mention made of deaths from gonococcus infection, or from syphilis. Now, we all know that these diseases figure very largely as causes of death, for instance, in England and Wales, during the year 1907 there were 1,840 deaths recorded from syphilis. Dr. Osler, in commenting on this statement, says that if we are to appreciate the importance of syphilis among the deadly maladies, we must include the deaths from paresis, and locomotor ataxia, half at least of the deaths from softening of the brain; and other diseases of the nervous system. He estimates that at least 6,000 or 7,000 are annually slain every year in England and Wales by syphilis directly.

Now, this list of 6,000 or 7,000 deaths does not embrace the vast number of still-born children dead from syphilis. He says, in addition to this, if we include in this category the deaths from the coccus of Neisser we shall find that there should be debited to the venereal diseases many thousands of deaths annually—a mortality that comes only after tuberculosis, pneumonia and cancer.

Another point is that in the presence of any infectious disease the cardinal obligation of the physician is to prevent the extension of the disease, and the infection of others, but in the case of syphilis the only duty of the physician, as he understands it, is to cover up and conceal the fact—to protect the

secret of his patient. He does not seem to consider it a part of his duty to protect the other members of the household or the public from this very infectious disease. As Dr. Hurty intimated, we can never educate the public in this disease unless we tell the truth. The public has no conception of the enormous extent to which these diseases prevail.

The medical profession has not recognized its obligations to the public in this regard; and if a reform in vital statistics is to be instituted, I know of no one who is better qualified and who is more likely to inaugurate this innovation than the very able and courageous secretary of the Indiana State Board of Health.

DR. ARTHUR R. REYNOLDS, Chicago: Dr. Hurty's paper is most timely and should be placed in the hands of every physician throughout the country. I have always believed that it was the duty of all physicians to report cases of contagious diseases as well as births. They owe it to the public in return for privileges they enjoy. I think that most physicians think so, too; but often they neglect it, and sometimes assert that they should be paid for it. The pathetic instances and forcible illustrations that Dr. Hurty has given show that the duty is binding on us all.

DR. P. M. TOWNSEND, Marshalltown, Ia.: I attended a charity patient with a neglected case of chancroid—gonorrhea and syphilis—one of the worst cases that I ever handled. The girl was unmarried, and pregnant; and all summer I dreaded the decision as to what my duty was in regard to protecting other physicians. Knowing that the family was poor and that there would be no financial inducement for the physician to undertake the risk, I feared to report the case to the other physicians in the county, lest they might refuse to attend the case when the girl came to the time of confinement. Before I had decided what my duty was toward my fellow practitioners, the girl miscarried and called for a physician, and the secretary of the county association attended her. Later on I learned that a woman who was present at the time, and had to administer the anesthetic, knowing something of the neighborhood gossip in regard to the case, wanted to know if there was any danger of her "getting anything," and thus called the physician's attention to the possibility. Up to that time he had examined the patient without uncovering her person, but he then, in very great exasperation, having looked at the skin and external genitalia, scarred by the chancroids, said that if he had known what kind of case it was that he would not have attended it for a hundred dollars. We need more publicity in regard to venereal diseases, for our protection as well as for the protection of the public.

HENRY B. HEMENWAY, Evanston, Ill.: Certain diseases like smallpox are common-law nuisances; in other words, the courts have decided that they are nuisances, and therefore report-

able. Most diseases are not common-law nuisances. For example, malaria should properly be reported; but it is not a common-law nuisance, and so legally it can hardly be required to be reported unless the statutes specifically mention it. If gonorrhea and syphilis are to be reported (and I do not for one second question the advisability of it), the statutes of the state should definitely mention those diseases. The ruling of the board of health is always subject to the court action; and a court uneducated in matters of medicine must take the opinion of one physician as legally as good as that of another. Therefore the ruling of boards of health is liable at any time to be nullified by a court decision. Statistics, in order to be accurate, must be complete. Many physicians imagine that they may be compelled to report a case of scarlet fever, or possibly typhoid fever; but they take it that disclosing the presence of the gonococcus or syphilis in a patient, would be betraying professional confidence. That provision should be covered by a state legislative enactment.

DR. PRINCE A. MORROW, New York: The law in New York state is mandatory that all diseases which are infectious and dangerous to the public health should be reported.

DR. HENRY B. HEMENWAY, Evanston, Ill.: That expression "infectious" must be passed on by the court. Although malaria, for example, is infectious, and we know that it is infectious, there are many physicians who deny its infectiousness to-day; and therefore if we attempted to require the reporting of malaria, we might find that the court would decide against us.

DR. J. N. HURTY, Indianapolis: Of course, there is no doubt about the desirability of reporting the malarial diseases. That they will be reported eventually I have no doubt. But to secure reports of them at present seems to me to present insurmountable difficulties. We cannot yet obtain perfect reports of those diseases that the people think should be reported. The existence of scarlet fever is sometimes hidden. Until people understand their duty to their neighbors, how can we secure the reporting of malaria?

Of course, my conviction is that it is the duty of the physician from every point of view, to report vital statistics.

One of our most prominent gynecologists, a cultivated man, educated at Harvard College, and the Harvard medical school, contended that he should be paid for reporting a birth. That contention indicates a very serious situation, it seems to me. When the matter so particularly concerns, or may concern the material welfare, of his patient and the child, and the physician is the only man that can do it, I would say that he might just as well at a birth leave the placenta *in situ* as not to report its occurrence, because until he has attended to both matters he has not completed his work. Let him complete his work: then let him have his pay.

METHODS FOR EXTENDING POPULAR EDUCATION IN PUBLIC HEALTH AND PREVENTIVE MEDICINE

SENECA EGBERT, A.M., M.D.
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If a text were necessary for my address to you to-day, I should at once select the declaration of the revered Pasteur that "it is within the power of man to rid himself of every parasitic disease." Correlated with this is the more recent and almost equally impressive statement of Prof. Irving Fisher that "fifteen years at least could be at once added to the average human lifetime by applying the science of preventing disease," and that "more than half of this additional life would come from the prevention of tuberculosis, typhoid, and five other diseases, the prevention of which could be accomplished by purer air, water and milk."[1]

Note that this latter authority says that these results could be achieved "at once" and, by inference, with the knowledge that we already possess concerning the causation and elimination of transmissible maladies and the possibilities of preventive medicine. We need not wait indefinitely for further necessary contributions at the hands of those searching for the secrets of unsolved problems of disease; we have abundant equipment for action and results even now.

In raising the question as to why we are not already enjoying a consummation so devoutly to be wished for, I would not have you feel that I desire to minimize or

1. Abstract of the Report on National Vitality of the Committee of One Hundred on National Health.

to mar in any way the glory of the wonderful and all-important achievements in the conservation of human life, health and happiness that have already been secured by zealous workers, almost all of whom, I am proud to say, have been members of our beloved profession. Their fame is secure, but their work has only blazed the way and opened up vistas of the far greater possibilities of the future.

Nevertheless, the query is insistent why, where so much is at stake, the potentiality of the future is not already the accomplishment of the present. Considering what physicians actually do and have always been striving to do along these lines, it cannot be fairly said that the incompleteness of the present status is due to lack of either faith or effort on their part. Whether we like it or not, we must realize that the time has come when it is absolutely necessary that others—yes, many others of many varied pursuits and callings—should take up a share of this portion of the "white man's burden" in which the physician has been the pioneer. A striking analogy in the field of human uplift which exists at the present moment will serve to validate this latter assertion.

From time immemorial the clergy of practically all religious creeds have been the leaders in and have done the chief work in all phases of religious activity. The laity have been content to give moral and financial support, more or less hearty according to conditions and circumstances. But suddenly within the last few years there has been developed a tremendous laymen's missionary movement in which are enlisted men of all creeds and denominations, which has already shown great power and influence and which promises to accomplish more in a few decades than has been achieved in many centuries of the past. I could speak of other manifest signs of social awakening, of the realization on the part of the good citizen that he is his brother's keeper, and that active altruism must supplant selfish inac-

tivity and indifference. Therefore, the time is ripe to call the laity to our aid, and already the first steps have been taken toward this end.

Thus, we find not only that do current newspapers and magazines contain with increasing frequency popular articles on subjects pertaining to preventive medicine, but that the American Medical Association has organized a Board of Public Instruction on Medical Subjects—whose work will be largely along the lines that I am indicating—and especially that at our meeting last year in Atlantic City this Section became sponsor for and the Association authorized the Public Health Education Committee, of whose purposes and work I shall have more to say later.

It is entirely unnecessary and it would be a waste of your time and an abuse of your patience even to mention the many subdivisions and phases of preventive medicine which any plan of general popular education for this purpose involves. My desire is rather to discuss some of the means whereby positive results may be most readily secured under present conditions and by which the most profitable expenditure of effort and energy may be made. Nor am I unmindful that some, if not all, of the suggestions may seem trite and commonplace to you who have been for years engaged in the pioneer work of this great propaganda. In my own teaching I constantly find the tendency to overlook or to minimize important features because, through frequent repetition, I have become imbued with the feeling that they must be known and recognized by every one. Nevertheless, we have evidence on every hand that many of the simplest sanitary truths and principles are entirely unknown or unheeded by many of even the intelligent members of our communities. And as some of the most important and most insistent features of our work has to do with those persons who cannot be thus classified, but whose ignorance prevents even the appreciation of the importance of hygiene and prophylaxis, I trust that

any review of familiar methods may not seem inappropriate and out of place.

Moreover, I shall scarcely attempt to present the several methods in a logical sequence or with any idea of their respective correlation. In fact, I doubt whether one could place them in scientific and orderly array at this time, especially when different localities and conditions demand varying means and application of means. But, as our hope is in the future, and as the children of this generation are to be the citizens of the next generation, I may as well begin with them and with the chief medium of their education, the schools. Schools imply teachers, and so the question arises: Whence come the teachers and what preparation have they had for giving instruction, both subjective and objective, both didactic and practical, on the fundamentals of health and life? Surely no one at this day will cavil at the proposition that physical development is as important as mental, and that every child should be informed as to the functions and needs of the body, as well as of the mind. But we have scarcely appreciated the equally important fact that the future citizen should be taught his duty in conserving the welfare of others and the altruistic aims of modern hygiene and sanitation. Can his teachers give him this training? I think that any extended investigation will convince you that the number of those capable of doing this in a thoroughly satisfactory manner is very small in comparison with the total number. No criticism of the average teacher is altogether fair under present conditions, however, as the blame for his or her inefficiency lies higher up and chiefly with us, ourselves. Really, we are more concerned with the future, provided we date from now.

According to the United States Commissioner of Education, there were in the public and private normal schools of the country for the year ending June, 1909, 82,288 students enrolled in the regular training courses for teachers, and 14,155 graduates therefrom. Added

to these, there were in public and private universities. colleges and high schools enough others pursuing teachers' training courses to bring the total up to 103,-824; and if the latter institutions "had furnished from their normal students the same proportion of graduates" as did the normal schools, the additional "number would have been 3,704, thus increasing the number of trained teachers to be added to the teaching force of the country in 1909 to approximately 17,859." Provided that each one of these teachers shall have been equipped and qualified to teach what every boy and girl has a right to and should know about personal hygiene, public health and preventive medicine, there is here a mighty power for good whose benefits to the next generation and to the country's welfare no man can calculate. And yet this is but one year's output.

Few here would argue, I take it that any pupil of high-school grade should not be thoroughly instructed in the fundamentals of sanitation and public health, or that our higher institutions of learning should not help to make better citizens along these lines. What a potentiality for good, then, was there enfolded in the 1,034,827 students of high-school grade that the Commissioner of Education tells us were enrolled for the year ending last June, or in the 331,418 students in higher education, even though the proportion of the former was only 11.72, and of the latter, 3.75 to each one thousand inhabitants!

In addition, more than sixteen million other children were enrolled in the public schools of the country in 1909, and it is also estimated that the total number of children from 5 to 18 years of age was 24,613,783, or almost half a million more than the estimated number of males 21 years of age and over. Is it not worth while to attempt to awaken the interest of our superintendents of public instruction and other educational authorities?

Another way of reaching many of these children and some of the adults is through the public playgrounds and recreation centers which are being established in many of our cities. The number of these is already greater than most persons realize. Thus, in 1909, there were 1,535 of them in 267 of the 336 municipalities in which supervised playgrounds are maintained, and in 259 of these cities there were 3,756 persons employed as supervisors and play-leaders. The latter large and increasing body of intelligent men and women, many of whom have had expert training in physical culture, can exert a tremendous influence, not only indirectly by subjectively developing in their charges an active appreciation and desire for health and sound bodies, but directly by inculcating whenever opportunity offers many of the fundamental principles of personal hygiene and public health. That this may be done most happily in an environment of baths, gymnasium apparatus, open-air sports and games for children of all ages must be obvious to all.

Leaving the children for a time, and considering the public at large, we find it no small problem to determine how we may reach and benefit the largest number most efficiently. Those who have undertaken the work have found that no one plan or method will suffice, and that the best intentions and service is oftentimes illy repaid or appreciated. In planning work of this kind, however, it may be said that the methods adopted should be devised so as to attract and hold the attention of the individuals concerned and to convince them that they are personally and especially interested. We cannot afford to ignore the fundamental principles of psychology and pedagogy in this domain.

Heretofore the brunt of what work has been done has fallen on our national, state and municipal health officers and their assistants, and the country will ever owe an irredeemable debt to these men who have done and are doing such valiant service. They realize, however,

that the task has grown too large for them, backed, though they are with official power and funds, and they welcome the aid of every progressive physician and earnest citizen who will help to further the physical welfare of the people committed to their care.

Among the efficient means which these health officers have heretofore employed to extend sanitary knowledge are, on the one hand, the weekly or monthly bulletins and the annual reports on the state of health of the communities under their respective jurisdictions, and on the other, the special tracts or pamphlets carrying precise information relating to the precautions to be observed when certain specific diseases occur in either sporadic or epidemic form. The latter have the great advantage that they reach the individual when he is in a highly receptive mood and most likely to heed and to be impressed by the information they contain. As for the bulletins and reports, there is the twofold danger that their distribution may be too much limited, whereby they may fail to reach those whom they might benefit the most, and also that they may fail to interest the average individual by being made simply a compilation of dry vital statistics. There are, however, many of these publications to which this latter criticism does not apply, a notable example being Chicago's weekly bulletin which bears the title "Chicago School of Sanitary Instruction," and which has at its head the statement that it is "sent free to those of our citizens who should be benefited by it." The annual health reports of our states and larger cities also contain much valuable and interesting information, and are worthy of a wider distribution and more extensive study than, I fear, most of them receive.

A number of progressive health officials are now using the newspapers of their territory more extensively than ever before as a means of reaching the public and keeping it in touch with the progress of their work, their needs and their purposes and aims. The Commissioner

of Health of my own state, Dr. Dixon, systematically takes his constituency into his confidence by utilizing the facilities of the newspapers of the state to the extent of 600 or more, and the corresponding official of Philadelphia, Dr. Neff, has likewise greatly strengthened his administration in the public estimation by a free and frequent use of the city papers.

Other agents under the direction of directors, commissioners of boards of health are the medical and other inspectors, including school and visiting nurses, all of whom are enabled to give direct, positive and timely instruction and advice to those who most need it and who are often least likely to get it from other sources. School medical inspectors also have demonstrated their value and the enormous advantage they have in detecting abnormalities and defects in their incipiency. Dr. Osler is reported to have calculated that there was in New York City "on account of the lack of medical supervision of educational work a yearly financial loss of $1,666,666," and also to have said in effect that "he considered it of greater importance to the nation that the question of sound teeth be intelligently considered than that the consumption of alcohol be restricted, important as the latter problem is."[2]

Reference to the newspapers calls attention to the fact that in the public press we have one of the most powerful and practicable factors for disseminating information and developing education along our special lines, and that as yet we have barely tested its possibilities. It is only when we realize that we have in this country almost 2,500 daily and over 16,000 weekly newspapers, not to speak of the great number of popular magazines and periodical publications of other kinds, that we can appreciate the opportunity they give us to reach the mass of the population. Moreover, their editors and publishers, almost without exception, are ready and even eager to give us abundant space for anything authoritative that

2. Fisher: Report on National Vitality, p. 73.

has to do with the improvement of public health. They have realized even more quickly than we have the popular demand for such information. In evidence of this, note the recent increase in the number of magazine articles on health topics.

It certainly should not be difficult to plan measures by which we could make use of this great medium to the fullest extent. Suppose, for instance, a health column supplied by some competent authority were printed in every weekly newspaper in a given state throughout the year—something by no means difficult to secure. Comparatively few families subscribe for and few individuals read more than one of these weekly papers. Hence the same "copy" could be used for many, either simultaneously or by judicious distribution, and the same editorial effort applied to an extended territory. If, too, the state department of health should undertake such work, as is, in fact, being done in my own state, great economy of labor and expense would be secured, the matter for publication would go out with the stamp of authority, and the health department would be brought into that close touch with the people that is so essential for its success.

A caution is to be observed, however, whether state officials or others take up this line of work. Such published matter should be authoritative, educational and not above the capacity of understanding of the average reader. If the series could in part develop systematic instruction along certain lines, so much the better, but care should always be had that misleading or exaggerated statements should not be made, and that statistical or other information should be well grounded in fact.

Magazine articles, such as those by Dr. Woods Hutchinson in recent numbers of the *Saturday Evening Post*, and others with which you are doubtless familiar, are also of great value in fixing and molding opinion, and writers with special talent in this line should be encouraged to contribute their aid to the work. Like-

wise, publishers of religious, trade, agricultural and other specialized periodicals should also be urged to make the relationships of public health to their respective fields of work frequent and special features of their publications. As I have indicated, the opportunities for disseminating information in this way are almost innumerable.

Life-insurance companies and fraternal organizations that maintain insurance departments are in an especially favorable position to greatly benefit both their own and public interests, and some of them are already seizing the opportunity by official communications to their medical examiners and policy holders. In a circular letter to its medical examiners, dated April 15, 1910, the chief medical director of the Provident Savings Life Assurance Society says:

> The Policy Holders' Health Bureau, established by this society in August, 1909, has passed beyond the preliminary experimental stage. Tangible and practical results are already in evidence, which warrant the prediction of a permanent and growing field of usefulness for the activities grouped under the organization of such a bureau. . . . We have referred to our bureau work as "semi-public," for the reason that as the number of policy-holders benefited by our system increases, the general public will also become informed as to the value of periodical medical examinations, and there will be a growing tendency to employ physicians as inspectors and regulators of human machinery, rather than as necromancers who are expected to work miracles in the cure of established and progressive disease.

Dr. Dwight, medical director of the New England Medical Life-Insurance Company, says:

> For more than sixty years the life-insurance companies of this country have been storing up ammunition and developing an organization which, if properly used, would be almost sufficient in itself to turn the tide of battle for public health in favor of the forces of scientific effort.

Dr. Hiram J. Messenger, actuary of the Travellers' Insurance Company, prepared a table for Professor Fisher's Report on National Vitality, to show that the

life-insurance companies could probably make money now by taking a hand in the public health movement, and says:

> This table shows that if the companies were to expend $200,000 a year for this purpose and as a result should decrease their losses by the almost insignificant amount of twelve one-hundredths of 1 per cent., they would save enough to cover the expense. If such a plan as this were placed on a purely scientific basis and carried out by good business methods and all the companies pulled together for the common good, I should expect a decrease in death claims of more than 1 per cent. And a decrease in death claims of 1 per cent. would mean that the companies would save more than eight times as much as they expended or would make a net saving of more than seven times the expense—which would be about a million and a half dollars a year.

I need not dwell on the importance of public lectures on health topics, but it must be noted that these will not realize their full value for good unless attention be given not only to the selection of speakers and their choice of subjects, but also to proper advertising and the securing of large and interested audiences. In many instances, their values would be enhanced if they were given in connection with public exhibits, such as those on tuberculosis recently held in many of our cities; and in any community there would doubtless be a decided gain if most or all of such lectures in a season were systematized and arranged in a logical course under the superintendence of some organized body, such as a county medical society, women's club, college settlement or the like. It is also advisable that such organizations in the large cities should provide lectures in their respective tongues for the masses of foreign population that we find in certain districts. It may even be advantageous to increase the attraction by illustrating the talks with lantern-slides, or by providing some additional musical entertainment. But it is on these addresses and the visits of medical inspectors, district nurses and other sanitary missionaries that we must

chiefly rely for the principal education of these alien masses of our population.

In fact, I would recommend that in each of our towns and cities of moderate size, and in localized districts of the larger cities, there should be organized public welfare clubs, whose chief business should be the carrying on of this propaganda of public health work and sanitary instruction. Such clubs might be independently developed, or they might be made up of representatives from associations and organizations already in the locality, such as the beneficial and fraternal societies, women's or mothers' club, library association, Christian Endeavor and church clubs, etc. They should naturally include the physicians and clergy of the community, and every public-spirited man and woman who has an active interest in neighborhood improvement and the welfare of humanity at large.

Such clubs could thus not only arrange for a systematic course of public lectures and exhibits, but could institute and develop public health measures and improvements of all kinds. You will at once realize the many lines of activity which they might follow. They could call on the central health department of the state for statistics, charts and other material for exhibits on tuberculosis, typhoid fever, etc., and, in passing, I would remark that it would be well for the state health departments to have such exhibits prepared for the special use of just such clubs and organizations, which could use them in turn and on proper request and notification. The winter course of lectures would include discussions of local sanitary conditions, the dangers of patent medicines, the prophylaxis of social disease, the theory and use of antitoxins and vaccines, as well as the ordinary questions of hygiene, and would soon be appreciated by the public as of great educational value.

Organizations such as these could also make use of a means of arresting and fixing public attention that has as yet been too rarely employed—the public poster.

These posters, which have already been used in some of the large cities, as in Philadelphia and Chicago, are probably more practicable in smaller communities, because the smaller number needed greatly reduces the expense. Notwithstanding the multiplicity of newspapers and magazines and the opportunities they offer for exploiting our work, we must realize that not only do many of their users peruse them but carelessly and hurriedly, but also that many of the general public do not read them at all. Hence we should provide some other means by which "he who runs may read" and whereby he may be induced to take heed of that which is for his own or his neighbor's welfare. This the poster does, and it may be used in all sorts of places, such as billboards, shop-windows, street-cars, etc., where it will catch the eye and fix attention.

Care should be taken not to attempt too much on a single poster, since an excess of reading-matter in small type may lead to a failure to attract due notice. A few pithy, epigrammatic sentences, or often a single one, with at times a touch of local or timely wit, or, perhaps, a sketch or cartoon, will do more to fix the purport of the poster in the minds of those who take it in at a glance in passing than will a lengthy exposition that requires a halt of five minutes or so for its reading. We can afford to take a lesson here from successful advertising agents whose business it is to know human psychology to the end that they may drive impressions home within the space of the fleeting moment.

I feel confident that the judicious use of such posters in a community of moderate size would do much to secure public attention and excite comment, and that the public welfare clubs, health officers or others may well employ them to do what the newspaper and magazine articles cannot do. The poster will also be especially useful when printed in other tongues than our own and properly distributed in the foreign districts of our larger cities.

A failure to mention the potential assistance which we may have from the clergy and our churches would be to lose sight of a most important and powerful component of our body politic. The signs of the times show most positively that henceforth the minister to the soul and the physician to the mind and body must be more closely linked in their labors than ever before, that they must work together and not pull apart or against one another, and especially that this great field of preventive medicine is the domain of both. Ministers of all denominations should be encouraged properly to encourage and to instruct their congregation in the acquisition of the fundamental principles of bodily hygiene and altruistic sanitation and in the appreciation of these as important and necessary to the securing of spiritual health. Churches and parish-houses which now are idle on too many week-days should be opened and used for public lectures and meetings. What places could be more appropriate for joint talks from pastors and physicians on questions that pertain to the proper instruction of youth, the abuse of alcohol, social purity, etc.? Where better could the two professions join to combat false gods and dangerous doctrines? The physician can assist the preacher by giving him sound information and trustworthy data for his sermons, and by encouraging him in dealing with such topics, and the preacher can support and help the physician in his campaign against all that makes for disease and pain and suffering in their common neighborhood. That the congregation can do much in doing their share of the work, if they are only shown the way, is so obvious that I need but mention it.

Within the past few years the Department of Health of Pennsylvania has established 114 tuberculosis dispensaries, which are doing much good in an educational as well as philanthropic way. The professional nurse, who is attached to each of these dispensaries is especially valuable in this direction and "her ministrations amount

to a liberal education in the treatment of tuberculosis." She not only makes a first-hand investigation of each patient's case, securing data as to his family history, occupation, financial resources, etc.; but she visits him at his home and there instructs him and the other inmates as to his proper care and handling, how the others are to escape infection, and especially devotes particular attention to diet, telling the housewife what to cook and how to cook it. Thus far over 130,000 of such visits have already been made, each one affording an opportunity for instruction in sanitary details with a direct and immediate application thereof. The value of such educational work needs no argument for its appreciation.

I might continue to consider with you other ways and means for carrying on this missionary work of ours, but your patience may be approaching the limits of tolerance. Therefore, as the last but by no means the least of these beneficent and efficient agencies to which your attention is directed, I trust you will give full support and encouragement to the work and efforts of the Public Health Education Committee that had its inception in this Section a year ago.

No one at this time can afford to deny that one of the most powerful factors in general public uplift and especially in the extension of the very work in which we are interested, is the collective influence of the good and intelligent women of this country, as manifested not only in their special clubs, mothers' meetings, etc., but also in their individual homes and neighborhoods. It is this influence which the Public Health Education Committee desires to weld and unify into a mighty agent for this special work, and both this attempt and the primary endeavor to enlist in the campaign the women members of the American Medical Association is, I believe, worthy of our hearty commendation and support. Here certainly is a wide field for the energies of the woman physician and none of us need feel

jealous or envious of her entry on it. She can do more in certain directions than can the man; she has more leisure and adaptability for certain phases of it, and she can bring in, as the man cannot do, the joint influence and power of other women's organizations that will all work for better and healthier homes, communities and the common country. Let us congratulate the committee, therefore, on what it has already accomplished and help it to do still more in the future.

I shall not take time to do more than to mention the work of our Board of Public Instruction in Medical Subjects, for I assume that you are all so familiar with it that nothing that I could say would add to your sense of its importance, especially in this field of ours.

With this review of the means at our command, and from which many details have necessarily been omitted, I trust that I have made you feel that we are well armed for the educational campaign which must be conducted before we can hope to secure the results in the conservation of life, health and human vitality that we know it is in our power to have. Dr. Rosenau has recently said:

> The public health militia that I have in mind calls for the enrollment of all good citizens. Preventive medicine is the watchword of the hour, and enlistment in the cause can come only through education. There are two important factors in efficient public health work. One is the gaining of new knowledge through scientific research; the other is the diffusion of this knowledge through education. The two go hand in hand. Not only the medical profession, but the people must be the reserve militia in any effective warfare against disease.

Professor Fisher likewise says in the conclusion of the summary of his report from which I have already quoted:

> Money estimates of waste of life are necessarily imperfect and sometimes misleading. The real wastes can only be expressed in terms of human misery. Poverty and disease are twin evils and each plays into the hands of the other. From each springs vice and crime. Again, whatever diminishes poverty tends to improve health, and *vice versa*. . . .

The conservation of our natural resources—land, raw materials, forests, and water—will provide the food, clothing, shelter and other means of maintaining healthy life, while the conservation of health likewise tends in many ways to conserve and increase wealth. The more vigorous and long-lived the race, the better utilization it will make of its natural resources. This will be true for two reasons in particular: First, the greater inventiveness or resourcefulness of vigorous minds in vigorous bodies. Civilization consists chiefly in invention and the most progressive nations are those whose rate of invention is most rapid. Second, the greater foresight and solicitude for the future. As it is usually the normal healthy man who provides life-insurance for his family, so it will be the normal healthy nation which will take due care of its resources for the benefit of generations yet unborn. . . .

Federal, state, and municipal boards of health should be better appreciated and supported. Their powers of investigation, administration and disseminating information should be enlarged. School hygiene should be practiced, and personal hygiene more emphasized. The multiplication of degenerates should be made impossible.

If one state, through the administration of one man and his staff and supported by the hearty co-operation of its municipal and county health officers, can within four years not only organize and establish a department of health almost *de novo,* but also show a positive saving to the commonwealth of $23,000,000 of human life value with an expenditure of $3,000,000; if it can, as Pennsylvania has done, within that time cut the typhoid mortality to less than half that it was before, bring down the tuberculosis death-rate from 134 to 120, and show a net saving of almost 14,000 lives, is there not every encouragement to continue with renewed energy whatever efforts we have been making in the past? Even though we are tempted at times to feel that much of the seed falls among thorns or on stony ground, we have no reason or right to conclude that the sowing is not well worth while; that the labor will not bring a bountiful harvest. Fortunate is he whose field of endeavor shows the promise of a more abundant reaping or fuller granaries in the end.

4814 Springfield Avenue.

ABSTRACT OF DISCUSSION

DR. W. A. EVANS, Chicago: Had I known that the Chicago charts were to have been displayed we would have made a more representative display. As Dr. Egbert has suggested, charts should be of many types to suit different audiences and different purposes. The credit for the *Bulletin* belongs to Drs. Reynolds and Reilly. They deserve the more credit because for several years they were severely condemned for it by editors of bulletins of the dry-as-dust type.

DR. ROSALIE SLAUGHTER MORTON, New York: I appreciate Dr. Egbert's reference to the work of the Public Health Education Committee, but I feel that the first expression of appreciation should go to this section, for it was here the committee originated, through a resolution introduced by Dr. William M. Brumby, health officer of Texas, and unanimously passed on the morning of June 10, 1909. According to the terms of that resolution we have organized work which has been carried forward by about 1,500 members of the American Medical Association. We owe a debt of gratitude to Dr. Prince A. Morrow, who, as chairman of the executive committee of this section, advised us as to the beginning of the work and has given us in many ways the benefit of his valuable experience. Through Dr. Van Fleet, New York representative of the Committee on Public Instruction on Medical Subjects, it was ascertained that they were arranging to distribute syndicated newspaper articles and editorial leaflets, and that therefore our proposed plan of work would constitute no interferece with the plan of this committee, but on the contrary would, in Dr. Van Fleet's opinion, be of assistance to them, and he urged us to put it into effect at once. As a preliminary step the work was divided under state secretaries, conservatively chosen, and in many cases appointed on the recommendation of their county medical societies or of their state health officers. In each state the detail of work was carried out by city secretaries or county chairmen, whose duty it was to learn which representative physicians would be willing to assist, by giving from one to four lectures during the year. A plan of work leaflet was issued setting forth the resolution under which we were organized and giving a list of twenty-eight lecture topics, so arranged that in many cases the prestige of the specialist would be added to the force of the teaching. These leaflets were widely distributed, the name of the county chairman being added, according to the locality, and in this way the same form was used throughout the United States. The requests received for these lectures exceeded our expectations, and it was found that in 211 classes there were large numbers of earnest, thoughtful women, anxious for authoritative information leading toward the protection of the health

of their children. I am sorry that I must disagree with one of the points made by Dr. Egbert, as to the advisability of resorting to any means by which to attract the public, even to vaudeville performances. In my opinion this would be a mistake. Part of the success of our main series of lectures in New York City was due to the fact that they were held in the New York Academy of Medicine, thereby gaining an added authority and prestige. It will be seen in the printed report of our year's work, under our section on "Affiliated Public Health Work," that Dr. S. Josephine Baker, chief of the Division of Child Hygiene of the New York City Health Department, has carefully collected data from each state, in order to avoid all duplication or interference with the lecture work of many health boards. Under our subcommittee on medical literature you will find a list of books of value in supplementing public education, and as this is incomplete any suggestions as to additional publications would be appreciated. We hope that each member of this Section on Preventive Medicine and Public Health will so cooperate during the coming year, that these lectures may constitute an increasingly useful part of the work carried forward under this section.

DR. ARTHUR REYNOLDS, Chicago: If I understand Dr. Egbert correctly, he intends to convey the idea that the knowledge of medical men should reach the general public; if it did, great good would be done. I wish to endorse that idea. Seventeen years ago in Chicago we had a grossly polluted water supply. We set out to teach the people that they should either boil the water or not drink it at all. Although the water supply remained about the same for seven years, our typhoid mortality and our mortality from diarrheal diseases went down year after year, so that from being the highest in 1891 and 1892, Chicago became among the lowest among large cities of the country. This was due to the fact that we taught the people through the newspaper to boil the water, or else not drink it at all. Those bulletins on boiling the water were displayed in large type in substantially all of the newspapers, much of the time day after day, during all of those years.

DR. WILLIAM C. WOODWARD, Washington, D. C.: Reference has been made to the need for facts in the possession of the medical profession concerning hygiene reaching the public. I want to go a step further back, and say that it is even more important that the rank and file of the medical profession itself should in the course of its education and training be properly acquainted with such facts. We know that hygiene, both personal and public hygiene, is entirely too scantily treated in the ordinary medical course.

I want to add one word, too, relative to the dissemination of knowledge by the medical profession, and that is, that if the

medical profession is going to have the public believe in hygiene, the physician himself must be an example to the public. I do not mean by that merely that the men who are attending our medical societies, the men who are leading the movement in the interest of public health, must live lives that will be patterns to their patients and to the community, but that every medical man must do so. It is more important for the medical man who is treating a poor, ignorant class in the community, to be personally clean and to have his offices represent a mode of life in accordance with the ordinary doctrines of hygiene, even than for the better class of the medical profession to do so. Until we can make the medical profession have a proper faith and then live up to that faith, I do not believe we will make the most rapid progress.

DR. JOHN H. WHITE, New Orleans: There comes back to my mind a statement made by the orator at the Chicago session, to the effect that the dogmatic assertion of the half-educated man carries further and fastens itself more firmly in the mind of the untutored than the carefully thought out statements of the scientist. Now, our children receive some education in public health matters, in graded schools in some parts of the country; but it is a sort of public health education that is absolutely worse than useless, because of misinformation given, as in a school recently in our city when the lecturer on hygiene told the pupils that yellow fever and plague were transmitted by the bad water, in spite of the fact that we have given the public school children instruction on correct lines, during our campaign, to the extent of two or three lectures to every public school in the city.

Now, my point is that while we are asking for proper instruction in the elements of hygiene in the graded schools, in the colleges and seminaries, I think it ought to be emphasized that that instruction should be in the shape of text-books written by properly qualified scientific men.

DR. MAZYCK P. RAVENEL, Madison, Wis.: In regard to the use of the theater for instructing the public along the lines of preventive medicine, may I tell you what we have done at Wisconsin? Many of you have probably seen notices in the newspapers of the play, "In Germland." This was given by the young ladies taking work in the department of bacteriology and hygiene at the University of Wisconsin. The characters were all dressed in costumes representing as nearly as possible various germs as we see them in stained preparations, both the useful and the harmful germs being represented. No charge was made for admission, cards of invitation being issued. It was given as a department matter for our own entertainment and instruction, yet the demand for admission from outside taxed the resources of our hall to the utmost, and throughout the country the greatest interest was excited.

Our stage scenery was made as instructive as possible. We showed dirty roller towels on the wall, spittoons, garbage cans marked No. 23, the common drinking cup, the common sponge, the feather duster, the broom—emphasizing as much as possible the bad features of such things. We had a large rat-trap containing the rats which the women have been wearing in their hair so much of late. A garbage barrel filled with broken bottles and tin cans was called the "Germ-ania Theater" and the play announced was "The Place, the Man, and the Germ."

These things as we presented them were quite amusing. They catch the popular eye and at the same time give a great amount of instruction to those who have never thought on such matters before. This play is being revised and improved and during the coming year is to be put on the stage by professionals. I am sure this sort of work will do an enormous amount of good in educating the public.

THE RÔLE OF PATHOLOGY AND PHYSIOLOGY IN PREVENTIVE MEDICINE

WALTER L. BIERRING, M.D.
IOWA CITY, IOWA

Preventive medicine, in the nature of things, may well be accepted as the criterion of the state of scientific medicine. That it is again coming into its logical place is due to the great progress which has been made during recent years in all branches of scientific medicine, and in this development the studies in pathology and physiology have been of fundamental nature.

In this symposium I take it that the part assigned to me is to refer in a concise way to the prominent facts contributed through the avenue of pathology and physiology which have influenced preventive medicine. I recognize that this will be largely a review of well-known facts, and I fear there will occasionally be some encroachment on the subjects treated in the other papers of the program.

In the memory of many now living, our conception of the nature of the disease has been revolutionized, and with the recognition that its ultimate processes, whether produced by external agents or the result of modifications in the normal metabolism, are chemico-physical, we have reached a standpoint from which to approach the problem of prevention and cure in a rational way.

TUBERCULOSIS

In no phase of preventive medicine has the knowledge of causative conditions been a greater factor than in the prophylactic control of tuberculosis, the real advance

dating from the time when the etiology and infectivity of this disease were established.

It was an interesting fact that the true significance of the pathologic lesions and their infectivity were recognized long before the tubercle bacillus was demonstrated. Klencke in 1843 first demonstrated the infective nature of tubercle by producing general miliary tuberculosis in rabbits by inoculating "tubercle cells." The importance of his discovery was not recognized until in 1865, when Villemin by carefully controlled inoculation experiments on rabbits confirmed Klencke's views and demonstrated beyond doubt the infectiousness of tubercle by transmission from animal to animal.

Klebs in 1868 demonstrated by animal inoculation that the sputum of tuberculous patients contained an infective element which was capable of producing the disease in guinea-pigs. Chauveau in 1868 infected calves by feeding them bovine tuberculous masses. Gerlach in 1870 by ingestion experiments demonstrated the infectivity of milk from tuberculous cows. Tappeimer, in a series of experiments beginning in 1877, demonstrated beyond doubt the infectiousness of phthisical sputum by inhalation experiments. Giboux, in 1882, succeeded in infecting rabbits by confining them in boxes into which tuberculous patients had expectorated, thus demonstrating long before Flügge's classical experiments, the dangers of sprayed particles of sputum of phthisical patients.

Thus the infectiousness of tuberculous matter in man and cattle, the dangers of tuberculous sputum and milk, the identity of the different tuberculous lesions in man and animals, and the established value of animal inoculation as a diagnostic aid were fully known before the birth of bacteriology and before the epoch-making paper of Koch in 1882 announced the discovery of the tubercle bacillus.

Koch confirmed Cohnheim's views as to infectiousness being the best criterion of tuberculous disease, but the

establishment of the value of the microscopic search for the tubercle bacillus in diagnosis placed the prophylaxis of tuberculosis on a scientific basis, and demonstrated wherein the sources of danger existed. Subsequently Cornet contributed his exhaustive experiments demonstrating the dangers of dried sputum, indicating one of the principal modes of infection to be by inhalation of dried particles of expectorated material contained in dust from rooms inhabited by tuberculous patients. Later Flügge proved the danger of droplet infection in the immediate neighborhood of such patients.

The entire system of hygienic care of sputum and other discharges has been built up on these results, and in this newer knowledge of tuberculosis the field of general sanitation has been greatly enlarged; the recognition of the widespread prevalence of the infection, the great frequency with which healed lesions were found, and the knowledge of the importance of the character of the tissue soil, led to the adoption of present day sanatorium,, open air, and dietetic treatment with all their beneficent results.

Results are at all times most convincing, and in no way is this more clearly shown than in the decreased death-rate from tuberculosis during the past three decades. In England there has been a decrease of 50 per cent. since the discovery of the tubercle bacillus. In New York City during the past twenty years the reduction in the death-rate from pulmonary tuberculosis has been nearly 40 per cent, and in Prussia the death-rate has been notably decreased, being 50 per cent. less in 1903 than 1885. In Boston, during the last thirty-one years the diminution in death-rate from tuberculous disease approximated 55 per cent., a decrease representing in actual saving 14,412 lives. Thus has the sum of human happiness been advanced by this phase of scientific medicine.

TYPHOID—CHOLERA—DYSENTERY

A second interesting chapter in preventive medicine is presented by the studies on typhoid, cholera and dysentery.

Before any successful warfare can be waged against an infectious disease it is of the highest importance to know with precision the nature of the agent which produces the disease, how it invades the individual, what its method of action is, how it is excreted, and finally how it perpetuates itself outside the living body.

The aforenamed diseases are associated principally in their symptoms and pathology with the intestinal tract, and in a search for the causes of these diseases it was but natural that the study should focus itself on the rich bacterial flora of the intestines. While the specific micro-organism for each of them has been determined, it has not been possible to produce the typical clinical picture in the lower animal, so that in a sense there has been a break in the chain of evidence associating a micro-organism with the disease process. Aside from the influence on municipal hygiene and general sanitation, these studies have added to our knowledge in another direction of far-reaching importance—in the discovery of the so-called Pfeiffer phenomenon.

In the early nineties Pfeiffer successfully produced a state of immunity in animals with typhoid bacilli and cholera vibrios in which they could stand, without symptoms, doses which at first would have proved fatal.

In further study he investigated the fate of cholera and typhoid germs introduced into the peritoneal cavity of immunized animals, the germs becoming clumped together and dissolved—the animal remaining in good health. This clumping, agglutination or dissolution, of disease germs under the influence of specific immune agents constitutes the Pfeiffer phenomenon, which in many ways has revolutionized our knowledge of infectious diseases.

A similar agglutination was observed in the serum of a sick human being, also likewise produced in a test-tube, and through the further elaboration by Grueber and Widal was brought forth the so-called Widal test, a diagnostic procedure most valuable in typhoid fever and many other diseases.

The importance of a specific reaction such as the agglutination phenomenon in the diagnosis of fevers with symptoms specially referable to the intestinal tract requiring the isolation of organism from the stool, is apparent.

It is impossible to say how many lives are saved annually and how much disease and suffering are prevented through methods of diagnosis alone made possible by the discovery of Pfeiffer's phenomenon. Indirectly it has influenced the development of protective inoculation, as furthered by Haffkine in cholera, Shiga in dysentery, and Leishman and Chantemesse in typhoid fever.

The rôle of chronic typhoid carriers is now recognized as an important factor in maintaining typhoid infection in a community, and the knowledge that such individuals may exist in any community will strengthen to a very great extent the hands of the health officers in checking the ravages of the disease.

INSECT INFECTIONS

It was also in the study of this class of infections that the transmission of disease by means of insects was specially developed. Much evidence has been brought forward in recent years to show that flies are frequent carriers of typhoid infection, and there can be no question of the proof of the same.

Fisher estimates the duration of life of typhoid bacilli in the bodies of flies as twenty-three days, and finds that they can live for some days on the head and legs of flies, illustrating that there are two ways of transmission—on the surface and within the body of the insect. During the Spanish-American War flies were important

agents in the transmission of the disease, and since then a number of epidemics have been traced to this source.

Perhaps one of the most important contributions to modern scientific medicine is the demonstration of the mosquito as an intermediate host in the transmission of malaria and yellow fever. To do justice to this remarkable addition to our knowledge would mean a review of the wonderful accomplishments of preventive medicine in Cuba, South Africa, and other regions once veritable pest regions in the tropics.

To-day the Canal Zone of Panama, for years the grave-yard of the white man, has a death-rate as low as that of any city in the United States.

The problem of life in the tropics for the white man has been solved, since malaria and yellow fever may now be prevented by very simple measures. And these are all results of laboratory studies which have placed in our hands power for good never before wielded by man.

BIOLOGIC AND PHYSIOLOGIC STUDIES

In the diseases diphtheria and tetanus, a new problem is presented. While due to specific micro-organisms, special toxic products are generated, and by learning to cope successfully with these toxins by means of antitoxins, humanity has been greatly benefited. Both diphtheria and tetanus antitoxin sera are active prophylactic agents, while their curative virtues, especially the former, have robbed these diseases of much of their terrors. The use of specific antibacterial serums has thus far not been very promising except in the case of the serum of Flexner and Jobling for cerebrospinal fever, in which it has produced most beneficent results.

The use of bacterial vaccines has no such field of usefulness as the antitoxins just mentioned, either in a curative or prophylactic sense, yet there is reason to entertain a hopeful view as to the future, for the progress within the past ten years inspires the greatest confidence.

The principle of producing a protective immunity by means of vaccines consisting of an attenuated virus, as illustrated by smallpox vaccination, inspired the brilliant achievements of Pasteur, leading to his epoch making contributions in connection with chicken cholera and anthrax, and out of which arose the marvelous researches of Pasteur and his co-workers on the subject of rabies, demonstrating the location of the purest and most concentrated virus in the central nervous system, and gave to the world the wonderful protective inoculation which has reduced the mortality in man to a fraction of one per cent.

The rôle of vaccination for smallpox in preventive medicine hardly requires any emphasis as its efficacy is generally accepted. An epidemic of smallpox is practically impossible in a well vaccinated community. Vaccination is also the only scientific means of controlling smallpox, and its adoption in the place of quarantine, as is the case in Minnesota, is a most logical procedure.

The triumphs of preventive medicine are reflected mainly through the advances in pathology and its handmaid, bacteriology, mainly because it has been more prominently concerned with the disease of distinctly infectious or bacterial origin; but equal benefit has come through the avenue of physiology by a better conception of a large class of noninfectious conditions; for a better knowledge of the functions of organs and their perversions has led to most remarkable results.

Medical science has profited in all its aspects largely from the purely biological researches, and coincident with the progress in the infectious processes a closer study of cell-life has led to the recognition of a vital activity or special function of cells, as illustrated by a better knowledge of the ductless glands. The attitude of Heidenhain in assuming a "vital activity" of epithelial cells resulted in considerable progress in the recognition of

processes of secretion and intercellular changes accompanying them. It is an interesting fact that the newer knowledge of the ductless glands is largely the result of cooperation with the clinical domain, and in most instances the newer conception of the function of these glands was contributed by the clinician.

In Hermann's well known work on physiology published in 1883 it is stated in one line that we know nothing of the functions of the thyroid and adrenals, but in the same year the contributions of Kocher of Berne, in an extensive report of the after-effects of complete removal of goitrous glands recognized for the first time the significance of the thyroid in the animal economy. The light which was shed on the vital importance of these glands lit up the entire field of internal secretions which had remained impenetrably obscure for many past centuries.

The intense activity of modern experimental medicine managed to bring to light in less than ten years the following important facts: 1. The relation of the thyroid to natural myxedema and cretinism and the surgical conditions of a similar nature. 2. The effects of the radical removal of a goitrous gland can be obviated by leaving behind a small part of the gland. 3. The extract of the thyroid gland is capable of removing the symptoms due to the natural or artificial absence of the gland. 4. The unrestricted use of thyroid brings on a condition which is very similar to the pathological complex known as exophthalmic goiter or Graves' disease or hyperthyroidism.

Associated with the brilliant chapter of thyroid investigation is that of the relation of the parathyroid to tetany or post-operative spasms. Beebe has observed that the nucleoproteins of the parathyroids are capable of controlling this symptom. MacCallum and Voegtlin discovered that this can be controlled also by the administration of calcium.

Although our knowledge of the function of the suprarenals is far from complete, the relation of the medullary portion to various pathologic and toxicologic states, as chloroform poisoning, shock, nephritis, etc., is recognized. We know it to be an absolutely vital organ, and exerts its physiologic influence by emptying its secretion into the blood; the extract that is obtained has proved of immense practical and scientific importance.

The discovery by Marie of the relation of the hypophysis to acromegaly ranks with the preceding brilliant results.

The production of experimental diabetes by Von Mering and Minkowski by complete removal of the pancreas has established the control of carbohydrate metabolism by the internal secretion of the pancreas. As the knowledge of this function becomes more complete there is hope that the prevention and treatment of diabetes will be on a firmer foundation.

By the studies of these vital organs that three decades ago were thought to be useless, surgery, therapeutics and general medicine have learned many lessons, and the field of preventive medicine has likewise been enlarged.

It is only fitting that emphasis should be given to the recent advances in the physiology of the digestive organs, and their bearing on medicine and surgery, and indirectly on preventive medicine.

The researches of Cannon, Starling, and Pawlow on the movements of the stomach and intestines have greatly benefited the surgeon and given the internist a better conception of digestive processes and their functional disturbances.

The work in the physiologic chemistry of nitrogen-purin metabolism by Chittenden and Folin has placed modern dietetics on a scientific basis, and this, with the important discoveries relating to the metabolism of the inorganic constituents, such as those relative to acidosis, have opened up a new and hopeful chapter in scientific

medicine by suggesting a probable cause and preventive measures for nephritis, arteriosclerosis, diabetes, and other disturbances in nutrition.

CONCLUSION

The purpose and object of preventive medicine is to keep away from mankind those ills which interfere with the pursuit of happiness by crippling physical well-being. More exact knowledge of the cause and nature of disease enables the physician to prevent that damage, and therein lies the rôle of pathology and physiology in preventive medicine.

13½ South Dubuque Street.

THE RÔLE OF THE PHARMACIST IN PREVENTIVE MEDICINE

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PHILADELPHIA

The words "preventive medicine" have, to a commercial druggist, a significance which he has yet failed to grasp entirely in its far-reaching influences. The term "preventive medicine," according to our lexicographers, means, "something taken, used, or done beforehand to ward off disease." While, in one sense, prophylactics are medicines which are intended to prevent disease, specifically the term "preventive medicine" has a much wider application and means "medicine that aims to ward off disease by properly directed personal and public hygiene."

While the pharmacist has not, and should not have, the proper equipment for diagnosis and the prescribing of remedies in serious cases, he should be imbued thoroughly with the principles of preventive medicine, and, as far as in him lies, bend his energies in the direction of stamping out disease in season and out of season.

It would at first appear that the pharmacist's rôle is necessarily a restricted one and again the public, in some quarters, do not look to the apothecary to advise them not to take medicine, but very frequently such advice, if tendered, is apt to arouse in the minds of a patient or customer a suspicion of ignorance, for the public have been trained to expect that medicines are to be paid for—advice never; and it cannot be denied that a patient coming from a doctor's office, after hearing him discourage the use of any specific medicine for the case,

goes right to the drug store and asks the druggist to give him some relief from the hacking cough, because he thinks he cannot afford to travel to some more salubrious climate as his doctor has recommended.

It should always be the aim of the pharmacist to uphold the opinion of the physician, and if the customer demands a medicine which he has been in the habit of using to alleviate his cough it would be the duty of the pharmacist to say a few words against depending on the palliative, and certainly not encourage the patient to use such a weak prop. Just as a physician gives to a patient the best advice possible, so should the pharmacist refrain from giving any suggestion which would lead to the building of false hopes.

The pharmacist, is, of course, in business; his daily bread depends on his sales and he cannot be expected to give medical advice, for if he does he will be very apt to hear from the physician on the ground that he is trenching on the latter's prerogative, and the conscientious druggist is frequently placed in a very delicate position, for he is at a loss to know to what extent he may go, in discouraging the use of some questionable mixture and just how much he ought to say. Cases are frequent in which physicians have been unwilling to prescribe any medicine whatever, in certain cases and recommend instead, exercise, pure air, pure food, pure water, sleeping in the open air, etc., and when the patient refuses, or finds it impossible from his environment to take this advice, he has bought some preparation from a pharmacist and obtained relief.

A wise and skillful physician would often find it judicious, in order to secure the patient's adherence to preventive measures, to prescribe some safe mixture in addition. Pharmacists have for centuries furnished medicines which are prophylactics—vaccine in all its forms, serums, antiseptics, sanitary appliances and many others, even including drinking water in bottles. The tendency

of the modern drug store is in the multiplication of stock and branching out into side lines, many of which are not intended for the exclusive use of the sick.

Pharmacists can do much in the way of preventing infection from noxious germs. Cleanliness has come in with the antiseptics, and asepsis is being vigorously exploited. There have been several practices followed by careless and ignorant druggists which have undoubtedly increased the death rate in the past. Bottles and boxes which have been sent straight from the infected sick room to be refilled, bottles for holding oil emulsions, and other medicines, are usually sent back without cleansing thoroughly.

Corks are particularly dangerous as germ bearers; corks which have been in the mouths of tuberculous patients are often picked up by infants, and as everything goes into the mouth of a baby, is a source of infection. The habit of not removing the old label from the bottle or box coming from the sick room but pasting the new one right over the old dirt is a habit which has been animadverted against for centuries. Unclean, germ-laden hands and fingers in pharmaceutical manipulations should be carefully guarded against, and the disgusting habit, sometimes seen, of using the mouth as a cork phesser, by chewing the cork, is almost obsolete, thanks to continued preaching and teaching. Corks, bottles and boxes from infected sick rooms should be immediately destroyed; in fact, they should never leave the infected room. Prescriptions could easily be refilled by telephoning or having some member of the family, not infected, send a written memorandum giving the number and date of the prescription which is to be refilled, and then have the pharmacist send new containers.

The rejuvenation of corks, particularly for wine bottles and other beverages, is attended with considerable danger and whenever old bottles and boxes come into the store to be refilled they should be disinfected or sterilized, but

far better destroyed, so that their power for increasing disease may be eliminated. The intelligent pharmacist, when he is once awakened to the necessity for taking up his daily burden in preventive medicine, will be enabled to do a vast amount of work of benefit to his fellows.

ABSTRACT OF DISCUSSION

ON PAPERS OF DR. BIERRING AND PROFESSOR REMINGTON

DR. W. A. EVANS, Chicago: Discussing the theme of Dr. Bierring, I should like to know whether it is your judgment that health departments should offer their laboratories in the diagnosis of venereal diseases? Are the procedures conclusive enough and at the same time simple enough to be within our field?

Discussing Professor Remington's subject, has not the time come to standardize the sale of antitoxin? Antitoxin for curative purposes should not be given promiscuously any more than flour or quinin. On the other hand, it should not be sold for $1.50 a thousand. The way to standardize its sale is, first, to abolish "returns." This will require machinery for quick moving of the product. Second, to reduce the advertising and introduction expense. Third, to make its sale a cash transaction. Fourth, to have but two sizes—1,000 units and 5,000 units. Such a system should reduce the price to 30 to 40 cents a thousand, retail. Antitoxin at this price would save lives through (a) prompter use, (b) larger dosage.

DR. LISTON H. MONTGOMERY, Chicago: Pharmacists, while dispensing our prescriptions, are careless sometimes about removing the collection of dust and other detritus about the corks and necks of their bottles. I have noticed this. Take simple syrup, for instance; there may be deposits from flies and other filth which has accumulated. On more than one occasion I have gone behind a prescription counter and courteously and quietly called the attention of the druggist to such conditions. If a bottle prescription is filled, detritus, débris, dust, germs of disease, etc., may thus be dispensed. You will notice this as you examine and shake the medicine in the bottle at your next visit to your patient. Particularly is this true in collyria. In fact this condition of sediment is often present in other prescriptions that are dispensed. Of course not all registered pharmacists are careless in this respect, some are sanitary and scrupulously clean and remove whatever collection or deposit there may be about the cork or mouth of a bottle before they dispense a prescription.

I am careful about permitting a druggist to refill my prescriptions, unless he has my consent. I have printed on my blanks these words, "This prescription must not be refilled

without my order," or the words, "Non repetatur" printed thereon, unless it is something that is very ordinary and doesn't do any harm.

To illustrate, I have a patient, a lady, who has a mitral lesion, who is taking my prescription. She has a friend who has heart disease. My patient, desiring to favor her friend, gave the number of the prescription on the label of her bottle and she had the prescription dispensed and nearly died as the result of taking that medicine. She evidently had a different condition altogether from that of my patient.

DR. GEORGE EDWARD FELL, Buffalo, N. Y.: There is more to this subject than most of us appreciate. Some of my prescriptions have been filled for seven years after they were made. I heard of it by my patients telling me that they had been giving that prescription around, since it was made, which was seven years before. If such things do occur why not have the pharmacists help a little and disinfect the bottles that come back, if they are going to allow them to come back? I don't believe it is within our power to prevent the druggist from refilling prescriptions, or the patients from taking them back, even if we do lay down our law and request them not to do it. If it could be done, it would be a great help. I believe the pharmacists can do a great deal to aid us in preventive medicine in many ways.

DR. SENECA EGBERT, Philadelphia: In regard to the paper on pathology and physiology, I think we should all appreciate the wonderful assistance that has been given preventive medicine by these two sciences which, as the gentleman said, were thought thirty or forty years ago to be of no practical benefit to the doctor. Some of us have been advocating the exploitation of the knowledge that we now have. There is no question that we need to do that to get popular education; but we have only opened the door, as it were, in the matter of original research; and while I do not believe that the ordinary medical school is the place for carrying on all of the original research work, I do believe that every one of us ought to support those who are capable of doing it and who are doing it as admirably as our colleagues in the profession have done in the past two or three decades.

With regard to the paper of Professor Remington, there is another line in which the druggist, it seems to me, can be of tremendous assistance to us, and that is in his counter-prescribing in venereal diseases. If the druggist will not do that, and if he will send the patient to the doctor, there is some chance not only of prophylaxis but of education, a chance that otherwise might be missed. I do believe that this is one phase of the pharmacist's work wherein a great deal of good can be done, by telling a man or a boy who comes to him for a cure for diseases of that kind: "No, I am not the man for

you. We pharmacists, as well as the doctor, realize that to-day those diseases are no longer to be looked on as harmless troubles; they are diseases dangerous to you and to the community as well, and I cannot prescribe for or treat you."

DR. WALTER L. BIERRING, Iowa City, Iowa: I appreciate that in the field of preventive medicine we are making use, in a coordinate way, of the knowledge of the different fundamental principles which apply to the entire subject. There is also much in the suggestion of having laboratories associated with boards of health or with other bodies interested in preventive medicine, in order that special research work may add greatly to our knowledge along this line, and at the same time benefit the cause of general sanitation.

In Iowa we have been conscious for some time of the fact that there is much discrimination and hardship imposed by the high price of antitoxin, so the department of health has taken on itself to introduce a method of furnishing antitoxin, not free, but at a reasonable price. It has made arrangements with several manufacturers of antitoxin so that it is able to furnish the same at a rate of about 40 cents per thousand units; a supply is kept on hand at different depots throughout the state to facilitate its being easily obtained and arrangements are also made to have it transferred readily from one city to another as the particular depot may run short in its supply. In that way it is kept constantly fresh, and kept moving, which was a point specially mentioned in this discussion. By this method there can be no thought of pauperizing the citizen, yet it brings the antitoxin to such a low figure that no one will have an excuse for not receiving its benefit; and again, where the people are indigent and unable to procure it the county or municipal authorities will furnish it as needed.

I am sure what was said by Professor Remington in reference to the opportunity for infection in a modern drug store is very applicable, and therein lies a duty for physicians to do away with the pernicious practice of having prescriptions refilled, thus making such a medium as the drug store a source for the spread of infectious diseases.

PROF. JOSEPH P. REMINGTON, Philadelphia: The American Pharmaceutical Association has taken up the matter of what is called the declaration of the prescription; and the mooted question of the ownership, which has been discussed for so many years, is likely to be taken up in a business-like way. It is the intention to refill prescriptions when indicated by the physician, and only on his approval. You will see, later on, I have no doubt, published in THE JOURNAL of the American Medical Association, just what action was taken recently at the meeting at Richmond, Va.

I believe that if this Section, or the American Medical Association, would get up a properly worded request or circular which could be sent to the druggists throughout the United States, calling their attention to causes of infection in dispensing prescriptions, it would be received in a proper spirit. It is very desirable to call the attention of the druggist and the physician to this subject, so that causes of infection may be reduced to a minimum. Let the physician go in and say, if any bottle, box or container comes from an infected home destroy it at once and have the prescription refilled with new and clean containers. It only needs a little education on the part of physicians and pharmacists to remedy the evil to a very great extent.

FURTHER OBSERVATIONS ON THE MILK SUPPLY OF WASHINGTON, D. C.

G. LLOYD MAGRUDER, M.D.
WASHINGTON, D. C.

At the meeting of the American Medical Association held in June, 1907, I had the honor of taking part in the symposium on milk, held in this Section. At that time I submitted some observations on the origin and progress of the movement for the betterment of the milk supply at the national capital. Attention was called to statements made in the "Report on Typhoid Fever in the District of Columbia," [1] submitted by the medical society of the city to the House Committee on the District in 1894, and to the report of the Washington Milk Conference. This report was issued subsequently, Aug. 20, 1907, by the Department of Agriculture.[2]

Consideration of this subject is again desirable from the facts that national, state and municipal authorities have not yet fully realized the gravity of the situation; that many physicians still appear to be either ignorant or indifferent to the dangers, and that only recently at Washington, the National Association for the Study and the Prevention of Tuberculosis, in a series of resolutions regarding the pasteurization of milk showed itself loath to admit positively conclusive evidence of the communicability of bovine tuberculosis to man.

1. Report on Typhoid Fever in the District of Columbia, submitted by the Med. Soc. of the D. C. to the Committee on the District of Columbia of the U. S. House of Representatives, June 14, 1894.

2. Sanitary Milk Production. Circ. 114 Bur. Animal Industry. Dept. Agric.

Much interest was manifested in the presentations, which I made and great satisfaction was expressed that the officials and the scientific experts of the United States government had so actively joined in this movement for the improvement of the public health. I was so impressed with this reception of the work of the Washington Milk Conference that immediately on my return to Washington I sought an interview with Mr. Roosevelt, then President of the United States. At this interview I submitted the following letter:

In view of the agitation that is now going on in Europe and this country with reference to the question of the influence of milk on infant mortality, as well as the causation of tuberculosis, typhoid and scarlet fevers, and diphtheria, I would respectfully suggest that you direct the Bureau of Public Health and Marine-Hospital Service to make a thorough investigation of the milk industry in the District of Columbia from the farm to the consumer. For this purpose the Bureau should be empowered to have the cooperation of other departments of the government, and proper credit should be given for such aid.

Several foreign governments have recently ordered such investigations, and the reports are frequently quoted by writers in the United States on these subjects. These writers have expressed many divergent views.

The recent investigation conducted by the Bureau of Public Health and Marine-Hospital Service into the cause of the prevalence of typhoid fever in the District of Columbia, which report, including an examination of the milk-supply in the City of Washington, has been printed and will be issued in a few days, and the work of the Department of Agriculture concerning the milk-supply at the farms, have shown that many lives could have been saved and numerous cases of disease avoided by more careful attention to the health of the dairyman, as well as of the cows, and the handling of the milk at the farm, in transportation, and distribution in the city.

Much valuable information has been accumulated by both departments, which can be consolidated and developed so as to be utilized as a standard not only for the District of Columbia, but for the United States. This standard is very essential at the present time, and, with the facilities at the disposal of the United States government, should have equal weight with that of any other government.

It can be readily shown that much can be done to improve the milk-supply without materially adding to the cost of the farmer and thus to the consumer.

The report of such an investigation should be freely illustrated that it may serve as an educational document.

President Roosevelt had previously shown great interest in public health matters. He grasped the importance of the subject and immediately directed an investigation, which was conducted by recognized experts in the United States Department of Agriculture, the United States Public Health and Marine-Hospital Service of the Treasury Department, and Dr. W. C. Woodward, health officer of the District of Columbia.

These experts elaborated and endorsed in every particular the work of the Washington Milk Conference. Their report under the title of "Milk and its Relation to the Public Health," was issued in January, 1908, by the United States Treasury Department.[3] A revised edition was issued January, 1910, as Bulletin 56. While this publication is one of the most valuable ever issued by the government on public health, its value would have been greatly enhanced had it been submitted to a conference of writers of the various articles and the advisory board of the Bureau of Public Health and Marine-Hospital Service. Then probably the statements would have been in greater harmony and the endorsement of such a distinguished body would have added greatly to its authority.

The movement for the improvement of the milk-supply in Washington seems to have two distinct periods, one from 1894 to 1907, the other from 1907 to date. It will be desirable to recall some of the incidents connected with this movement and the results that have accrued. The progress of the first thirteen years was great; that of the last three years has been marvellous. The work done in Washington has exerted an influence

3. Bull. 41 Hyg. Lab. U. S. P. H. and M.-H. S.

not only in this country but also in Europe. In fact, its influence has also extended to Australia.

At a public meeting on Feb. 5, 1894, called for the purpose of aiding in the improvement of the sanitary condition of the city of Washington, the late Dr. Charles Smart of the army read a paper on "The Causes and Prevalence of Typhoid Fever."

The statements made by Dr. Smart were so startling and of such damaging character to the prosperity of the city that I called the attention of the Medical Society of the District of Columbia to them at the meeting held on February 7 and moved for the appointment of a committee to consider the subject. Dr. W. W. Johnston, Dr. C. M. Hammett and myself were appointed as such committee.

It was found that the conditions were even worse than Dr. Smart had represented. The committee considered that there were four principal causes for the occurrence of the disease: (a) Potomac water-supply; (b) pollution of the soil by the leakage from privies, defective sewers and the backing up of sewage from tidal movements; (c) to drinking of well or pump water; (d) drinking of contaminated milk.

Among the recommendations of the committee, which were unanimously adopted by the medical society, were the construction of works for the filtration of the Potomac or Washington water—the only method of purification—the abandonment as rapidly as possible of all wells within the city limits; the repairing of defective sewers; the extension of the water supply and the sewers; the making of house connections to these.

The views of the committee as to the unhealthfulness of well waters were fortified by the results of bacteriologic examinations of water from thirteen wells in the city of Washington, made by Dr. J. J. Kinyoun. The water from nine of these wells was classed as bad, and from two as suspicious. It was recommended that the

nine wells be closed and that the remaining four be kept under observation.

The influence of these two recommendations in the committee's report was immediately noticed:

> 9. Careful inspection of all dairies in the District from which our milk-supply is drawn, and the enactment of a law by which no milk shall be sold in the District without a permit from the health office. The inspection should cover an examination at the dairies of all possible sources of infection, including the water-supply.
>
> 10. The urging on the members of the profession of a careful collation of all facts bearing on the mode of infection in each case, and the advantage of reporting such facts to the society, and the propagation of the doctrine that immediate disinfection of the stools is the first duty of the physician as guardian of the health of the community.

It will be seen that pure milk and pure water, both in the city and at the farm, and the avoidance of contact with persons suffering with the disease, were the cardinal preventive measures recommended. The importance of these recommendations was immediately recognized. The United States Congress, as well as the city authorities, sought the aid of the medical society and individual members in framing remedial legislation.

That the recommendations made in 1894 were important and proper is attested by remarks made at the symposium on the causes of typhoid fever in the District of Columbia, held, on my motion, by the medical society, Feb. 19 and 26, 1908. Dr. George M. Kóber, professor of hygiene, Georgetown University, said that "every point developed in recent discussions, save the influence of domestic filters and water-coolers, had received consideration before." Dr. Kober's investigation in 1895 confirmed in every particular the conclusion reached by the committee of the medical society in 1894, and developed two new facts, viz., the percentage of imported cases and the agency of flies in the transmission of the disease. Dr. William C. Woodward, health officer of the District of Columbia, said that the

problem "Why is typhoid fever more prevalent in the District of Columbia than in other communities?" was clearly the problem before the medical society in 1894, when it inaugurated the campaign against the disease, and the clear realization of the problem to be solved contributed very largely, no doubt, to making the work of that committee as thorough and the results as complete as they were." It may safely be said that, aside from the one or two new facts brought to light by Dr. Kober's investigations, to which Dr. Kober has referred, no material fact has been disclosed by any subsequent investigation that was not anticipated in the report of the medical society.

The contention for pure water, pure milk, and the avoidance of contact, outlined in 1894, as preventive measures against typhoid fever is further sustained in Bull. 44 of the United States Public Health and Marine-Hospital Service,[4] as follows:

> Thus far our studies indicate that typhoid fever will cease to be a problem in any community having clean water, an uninfected milk supply, and in which cases of the disease are treated as dangerous and contagious.
>
> In drawing up the conclusions and recommendations of this report we have had the benefit of consultation with the advisory board of the hygienic laboratory, composed of eminent scientists and sanitarians. This privilege is appreciated and we desire to acknowledge the help we have received from the members of the board collectively and individually.

The first step toward carrying out the recommendation of the committee of 1894 was the passage of an act by Congress, approved March 2, 1895, which required the inspection of all dairy farms and a permit from the health officer of the District of Columbia before milk could be sold for consumption in the city of Washington. This requirement applied not only to the farms in the District of Columbia, but also to those in the states supplying milk to Washington.

4. Bull. 44 Hyg. Lab. U. S. P. H. and M.-H. S., May, 1908, p. 9.

CARD REGISTRATION OF DAIRIES

About this time Dr. W. C. Woodward was appointed health officer. He instituted the registration of the results of the inspection of the farms and depots on cards known as score-cards. Washington has the honor of being the first city in the country, if not in the world, to require inspection of the dairy farms as well as the milk depots in the city.

The use of score-cards has proved to be very popular as well as valuable. Many states and cities have adopted them. The United States Department of Agriculture reports that it has supplied them to about 300 cities in thirty-nine states, and that they are being widely used. The province of Ontario, Canada, has also adopted inspectors and the score-card system of recording such inspection. Previous to January, 1908, less than 50 cities had sought the cooperation of the Department of Agriculture in instituting inspection. These figures, however, do not represent the full extent of the use of the score-card system as it has been formally adopted by the state health authorities of fifteen states, and is being introduced by them in the cities under their supervision.

This inspection has revealed many unfavorable conditions both at the farm and at the city depot. Insanitary houses, milk houses and barns were common. The attendants on the cattle were careless of their personal habits and frequently were suffering from disease, sometimes of a contagious character. Cattle were frequently found covered about their flanks, legs, udders, and tails with manure and other dirt, which readily dropped into the pails while milking was being done. Cattle were many times found suffering from constitutional diseases as well as local affections of the udder. Flies swarmed about the premises. Frequently on the surface of the milk in the pails floated dead and dying flies. With the knowledge now available of the habits

of the fly, this condition alone is a most dangerous source of milk infection. Dr. L. O. Howard in a recent publication by the Department of Agriculture suggests that the common house fly be known as the "typhoid fly." The presence of sediment in the milk containers was a common occurrence. This is especially dangerous, since it has been shown that the ingredients are pus cells, blood, epithelium, barn-yard manure, and varied bacteria, including colon bacilli, and, as shown by Schroeder and Cotton, very commonly the tubercle bacillus.[5]

Few, if any, facilities were found for boiling the water to cleanse the utensils used in the handling and transportation of milk, the hands of the milkers, or the udders of the cows. Polluted water readily contaminates milk. This contamination rapidly multiples at a temperature above 50 F. The knowledge which is rapidly being accumulated as to chronic carriers of the typhoid bacillus, and the common custom which prevails in rural communities of depositing human excreta on the ground, frequently in close proximity to residences, barns, and water-supplies, demand that the water-supply on dairy farms should be frequently examined and carefully guarded against contamination. The location of the premises for the storage and the handling of dairy products in the city depots was frequently most objectionable and at times entirely unfit for such purposes.

The following are some results of one year's use of the score-card system of inspection at Indianapolis:

Dairies scored, 717.
Barns improved, 381.
New barns built, 41.
Milk rooms built or repaired, 319.
Visits made by request to advise about constructing new barns or repairing old ones, 137.

5. See Bull. 99 and Circ. 118, Bureau Animal Industry, Dept. of Agric.

The report of the official in charge says:

While at first we met with serious opposition, producer and dealer have become convinced that instead of persecution, the work is for their betterment.

Numbers have thanked us for insisting that they improve their conditions, stating that they do not see how they could have produced milk under the conditions they did.

The records of inspection as kept on score-cards show the result of intelligent inspection of the dairy farms supplying milk to Richmond from May, 1907, to May, 1908. The first inspection in May gave an average of 41.5 out of a possible 100; the inspection in April of the following year, twelve months later, gave an average of 72 for the same premises. This demonstrates a gain of nearly 100 per cent. for the year. The improvement was steady throughout this time.

In the annual report of the Richmond, Va., health department for 1908 the dairy inspector in his report to the chief health officer says: "The disposition among our dairymen to improve their plants is wonderful, and all speak highly of the work of the health department."

Washington city also furnishes an excellent illustration of the effects of intelligent inspection. The inspectors and the producer have learned to understand each other. Many of the farmers welcomed the criticisms and proceeded to remedy these defects, as it was found that much could be done at an insignificant outlay of time and money. Much higher scores were given in many cases on the second inspection. As a result of this educational inspection much milk is delivered to the distributing depots with less than 2,000 bacteria to the cubic centimeter.

At the meeting held Sept. 22, 1909, in Washington, of the Milk Producers' Association of Maryland, Virginia, and the District of Columbia, President Thomas in his address reminded the members of the association that the day was past when the milk inspector was "looked on as an irreconcilable enemy."

Such expressions show the spirit with which intelligent inspection is met. This educational inspection means much to both producer and customer. It contributes not only to the health of the families of both, but also to that of the dairy herd. It is a well-known fact that typhoid fever prevails to an alarming extent in rural communities. It has been found that it is two and a half times more prevalent in the counties of Maryland than in the city of Baltimore. Tuberculosis is also quite common in the country.

RESULTS OF INSPECTION

Inspection has worked well; it should be perfected and extended. It should be assumed by state and municipal authorities and not left to the enthusiasm of public-spirited physicians and other citizens. Washington has apparently had most satisfactory results from the requirements for inspection. Dr. W. C. Woodward, health officer of the city of Washington, D. C.,[6] says:

> The death-rate from diarrheal diseases among infants during the five-year period 1880 to 1884 was 162 per 100,000. During the next five-year period it was 168, and from 1890 to 1894 it was 175. In 1895 the milk law was enacted. From 1895 to 1899 the death-rate fell to 135; from 1900 to 1904 it fell to 109, and in 1905 it was only 104, and in 1906, 1907, and 1908 only 97 per 100,000.

In 1909 it fell to 72. It is gratifying to see that 405 fewer babies died in 1909 than in 1894, the year before the milk law was passed.

The diagram that accompanies Dr. Woodward's article (Chart 1) shows the above facts graphically.

MILK AND WATER AS AGENCIES

The improvement in the death-rate from diarrheal diseases, typhoid, malarial and typhomalarial fevers has also been very marked in the period since the enactment of legislation governing the milk supply, and es-

6. Bull. 41 Hyg. Lab. U. S. P. H. and M.-H. S.

pecially so since the active movement for its improvement started in 1907. The title "typhomalarial fever" is no longer used in the classification of diseases. It is a question if the many deaths attributed to malarial fever should not be considered as typhoid. The data of the one are similar to those of the other. Chart 2 well illustrates these observations. The rate 33.2 from

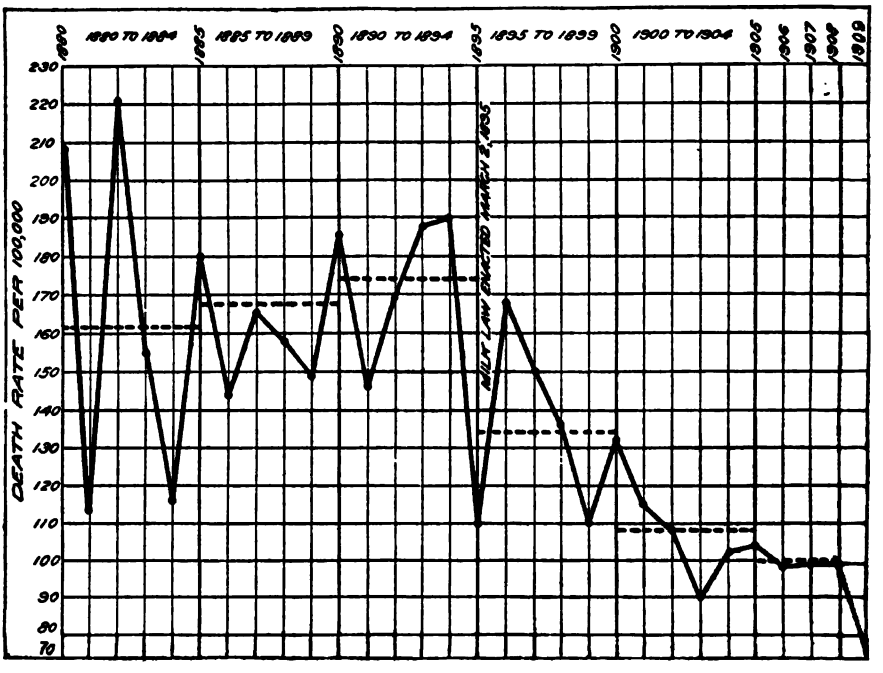

Chart 1.—Diagram showing decreasing death-rate of children under two years of age from diarrheal diseases in the District of Columbia following the enactment of the milk law of 1895. Dotted lines show averages. (In 1909 the death-rate fell to 72.)

typhoid fever in 1909 encourages the hope that Washington with continued improvement in its milk-supply will soon attain a much lower death-rate.

The rate in 1909 would have been lowered had the hospitals had a more nearly normal death-rate. There seems to be a connection between the death-rate and the milk-supply of the hospitals. In 1909 there were 780

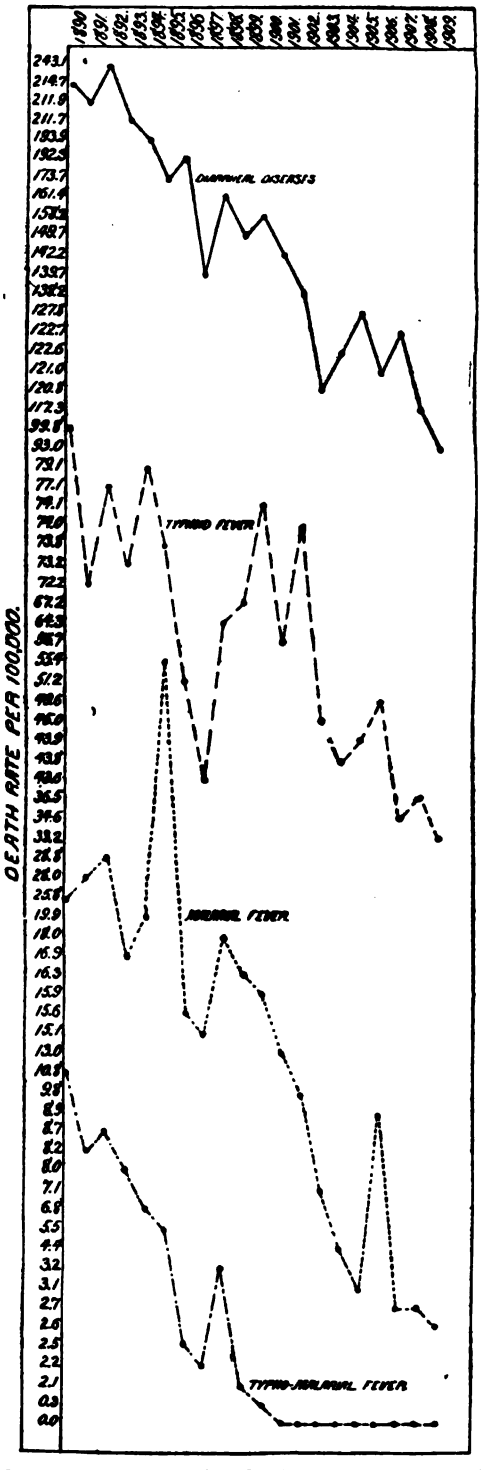

Chart 2.—Diagram illustrating death-rate per 100,000 of population for diarrheal diseases, typhoid fever, malarial fever and typho-malarial fever, during the period 1890 to 1909 inclusive.

cases of the typhoid reported with 114 deaths; 70 of these deaths occurred in hospitals. With the normal death rate of 10 per cent. 36 lives should have been saved.

With the limit of safety of "inspected" raw milk fixed at 100,000 the following numbers of bacteria per c.c. were found in milk furnished to Washington hospitals: 2,000,000; 2,800,000; 3,500,000; 4,000,000; 5,000,000; 10,000,000; 10,000,000; 15,000,000; 50,000,000; 111,-000,000.[7]

The mortality from typhoid in some Washington hospitals reached the appalling rates of 25, 20, 18 and 16 per cent., although a few have the normal death-rate of 10 per cent. But in only one instance was the German mortality rate of 5 per cent. approached, and this was as low as 7 per cent.

It will be noticed that the highest record was reached in 1890. Two factors can be considered as causing this. Kober has attributed it to unusual contamination of the Potomac water supply by the sewage from Cumberland, Md., where an epidemic of typhoid fever prevailed in the winter of 1889-1890. I attribute it to the greater contamination of the milk-supply. This was brought about by the abnormally high temperature that prevailed during the winter. The Weather Bureau reports it as having been the warmest winter for fifty years. No ice was gathered. Consequently milk was almost constantly exposed to a temperature conducive to the growth of bacteria. It is well known that colon and typhoid bacilli proliferate rapidly as soon as the temperature goes above 50 F. May this not help to explain the increased prevalence of typhoid in winter in localities where the temperature goes repeatedly above 50 F.?

The winter of 1889-1890, as stated, was the warmest for fifty years. The winter of 1908-1909 was unusually

7. See Bull. 41 Hyg. Lab. U. S. P. H. and M.-H. S., p. 431, et seq.

warm. The winter 1909-1910 was quite cold. From January to May, inclusive, in 1909 (warm winter) there were 236 cases of typhoid reported, while during the same period of 1910 (cold winter) there were only 126 cases reported.

Comparison of the diagram with the one prepared by Dr. Theobald Smith (Chart 3) on the seasonal prevalence of typhoid fever practically eliminates the Potomac water as a serious causative agent. The filtration plant now positively eliminates it, as is shown by

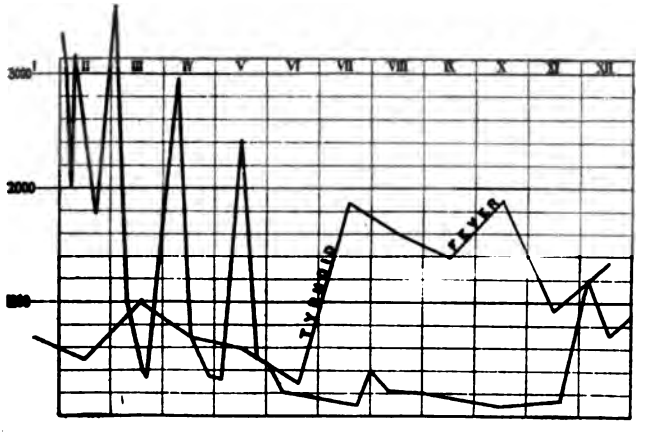

Chart 3.—Diagram prepared by Dr. Theobald Smith, showing comparative number of bacteria found in 1 c.c. of Potomac water in 1886, and also death-rate of typhoid fever during same year.

the accompanying table. There is no need to resort to the boiling of Potomac water.

Contrary to every expectation, there was no diminution in the prevalence of typhoid fever following the completion of the filtration plant in the fall of 1905 as compared with the few preceding years. Numerous investigations were undertaken and reports made; some covered conditions in the city, and others covered both the city and the dairy farms.

RESULTS OF TEST FOR BACILLUS COLI OF 10 AND 1 C.C. SAMPLES FROM FILTERED WATER, RESERVOIR AND TAP WATER FROM VARIOUS PARTS OF THE CITY

Fiscal year.	Number samples examined.	Samples in which *B. coli* was positively determined.	
		Number.	Percentage.
1905-6	502	8	1.60
1906-7	1,630	52	3.18
1907-8	2,232	42	1.88
1908-9	2,294	15	0.67
1909-10*	940	0	0.00

* Five months only, July to November, 1909, inclusive.

The Bureau of Public Health and Marine-Hospital Service issued three special bulletins on "The Origin and Prevalence of Thyphoid Fever in the District of Columbia." [8] From the peculiar limitations of the functions of this bureau the investigations were mainly of the conditions existing in the District—not in the outlying states.

Continued study convinced me that stricter attention must be paid to the conditions at the dairy farms, including their water-supply, to which I had called attention in 1894. I submitted these views to the Hon. James Wilson, Secretary of Agriculture, at an interview in September, 1906.

Under the direction of the Secretary of Agriculture, every one of the approximately 1,000 farms supplying milk to Washington was inspected by the Bureau of Animal Industry in the fall and winter of 1906-7. The average score of these farms was as low as 45.03 out of a possible 100. On 60 farms, taken at random, bacteriologic investigations of the springs and wells were made by the Bureau of Plant Industry. These were the first on record of an extended series of investigations of their kind. Dr. Kinyoun did make six such examinations in 1895, in four of which he found the water-supply to be contaminated. Previously the analysis of waters was only chemical. The revelations were startling. These showed that nearly one-half of the water-

8. Bulls. 35, 44 and 52, Hyg. Lab. P. H. and M.-H. S.

supplies were contaminated with fecal bacteria and that 25 per cent. of the remainder contained many more than 500 bacteria per cubic centimeter. The revelations of contamination are quite astounding in other states as they have been in the vicinity of Washington. Examinations have been made in the District of Columbia, Maryland, Virginia, Massachusetts, Illinois, Wisconsin and Minnesota. The latest report,[9] by Kellerman and Whitaker, issued Nov. 6, 1909, shows that out of 79 samples of water from as many farms in Minnesota 59 were polluted, and on 23 of these farms there was a record of typhoid fever. These studies have confirmed the contention of the danger from this and other contaminations of milk.

CONFERENCE ON MILK-SUPPLY

The investigations of the dairy farms and city depots supplying milk to Washington disclosed many alarming conditions. These were considered by the Medical Society of the District of Columbia and a number of interested citizens. I submitted the ascertained facts to Mr. Macfarland, then president of the Board of District Commissioners. Simultaneously Mr. Macfarland's attention was called to a suggestion made by Mr. E. Berliner that a conference be held on the milk-supply. This suggestion was made at a meeting held at Mr. Berliner's house, when there was a discussion of Dr. Schroeder's and Mr. Cotton's recent publication on the contamination of milk with tubercle bacilli and the significance of such contamination. Mr. Macfarland at once invited a number of gentlemen from private and official life to take part in such a conference.

It was shown that milk and dairy products were disseminators of disease. Repeated instances were cited of outbreaks of typhoid fever, scarlet fever, diphtheria and sore throat, as positively being traced to infected milk. The fearful death-rate among infants, directly

9. Bull. 154, Bureau Plant Industry, Dept. of Agric.

from impure milk, was shown. Attention was also called to the danger of milk as a carrier of tuberculosis. Fortunately while pointing out these alarming conditions, the conference pointed out the methods for modifying the danger. The proceedings of the conference were published by the Department of Agriculture as Circular 114 Bureau of Animal Industry under the title "Sanitary Milk Production." The value of the report was greatly enhanced by the fact that it was issued after careful consideration in conference by all of the contributors. It demonstrated the importance of occasionally having the cooperation of official and non-official persons. This furnishes another instance of the watchfulness of the Department of Agriculture over the public health.

The London *Lancet*,[10] in an editorial headed "Federal Text-Book on Pure Milk Questions," says of this circular:

> The Agricultural Department at Washington has issued a volume of reports containing the results of the conference of experts called together by the department to consider the various questions now agitating the country in regard to the purity of the milk-supply. The conference consisted of thirty-five recognized experts in the study of the questions involved. This volume will be the recognized text-book of the health authorities of this country for the present, as it carries the weight of authority of these experts, and the endorsement of the Department of Agriculture. In brief, these experts agreed upon a definite milk program and have recommended that public safety should be assured by legislation establishing three classes or grades of milk—namely, certified, inspected and pasteurized.

Constant instances of serious outbreaks of diseases from contaminated milk are being reported.

The occurrence of 600 cases of streptococcus sore throat in Stockholm, traced to a streptococcus abscess in the udder of a cow with other reports of similar infections has drawn attention to the necessity of immediate study of the significance of streptococci in market milk.

10. Lancet, London, 1907, II, No. 13.

The rapidly accumulating reports of outbreaks of typhoid fever resulting from milk infected by bacillus carriers have excited an increased interest throughout the world in the improvement of the milk supply. Dr. Biggs, like many others, has been so impressed with the danger from this source that he considers it almost impossible to secure a safe milk-supply without careful and repeated inspection, including complete and repeated bacteriological examinations of every one connected with the production and handling of milk. As a result of his report, covering this and other points, the New York City Board of Health has adopted an order requiring satisfactory pasteurization of milk used for drinking purposes.

In the fall of 1908 over fifty cases of typhoid fever in Washington, D. C., were traced to the supply of milk from a single farm. The owner was a bacillus-carrier. The supply of milk from this farm was stopped.

From the well-known prevalence of rural typhoid, the presence of bacillus-carriers, and the existence of contaminated water-supplies at many farms which can readily contaminate milk, it seems that milk is a far greater factor in keeping up the typhoid rate in Washington than a number of writers have been willing to admit. I have always contended that dairy products were the principal sources of the disease. In view of recent investigations, I reassert my position.

BOVINE TUBERCULOSIS

During the past three years extraordinary progress has been made in the study of the relation between human and bovine tuberculosis. The position of Koch that bovine tuberculosis is a negligible factor in the causation of human tuberculosis is no longer tenable.

The work of Schroeder and Cotton on this subject attracted universal attention. It was deemed to be of the greatest importance. The British Royal Commission to inquire into the relation of human and animal tuber-

culosis, confirmed these experiments in every particular, and so reported to the British Parliament in January, 1909, in its "Third Interim Report." Their report was based on the information obtained from these repeated experiments.

Influenced by this report the Board of Agriculture and Fisheries of Great Britain issued in May, 1909, "The Tuberculosis Order of 1909." This order provided that after Jan. 1, 1910, milk sold in Great Britain should come from tuberculin-tested cows, or should be sterilized. These two paragraphs from this order are very positive:

As your local authority are doubtless aware, the subject of tuberculosis in man and in animals, and the relations between the disease in human beings and in animals has been under careful investigation during recent years in this country and abroad, and various phases of the question have been inquired into by successive royal commissions. So far as regards the possibility of the transmission of the disease from affected bovine animals to man, the board are satisfied that it must now be accepted as a fact that tuberculosis is transmissible by the agency of milk used for human consumption. The Local Government Board concur in this view, and a bill was introduced in the House of Commons by the President of the Local Government Board on the 25th inst. designed, *inter alia*, to afford protection to the public health from the risk of the spread of tuberculosis by the means of milk used for human consumption.

In considering the question in relation to animals, the fact that the disease is communicable to man by milk has a material bearing on the measures to be adopted. Any action which results in the reduction in the number of tuberculous bovine animals in the country must reduce the risk of the spread of tuberculosis amongst the community, and if it were possible to eradicate from this country the disease in animals, a material step forward would have been taken in the campaign against the disease in man.

The accumulated testimony on the communicability of bovine tuberculosis to man was greatly accentuated in a paper by Dr. W. H. Park, director of the research laboratories of the Health Department of New York,

which he submitted in Washington, May 3, at the meeting of the National Association for the Study and Prevention of Tuberculosis.

In this paper he showed that 22 out of 84 cases of tuberculosis of children under five years of age showed the bovine type of tubercle bacilli. Dr. W. H. Welch noted that the cases reported by Dr. Park were not selected cases.

PASTEURIZATION AND STERILIZATION

Even though the danger of contracting tuberculosis due to bovine tubercle bacilli from dairy products can be eliminated, if we can obtain milk from healthy cows, there still remains the danger of contracting tuberculosis, due to human tubercle bacilli and other diseases from contaminated milk. Milk can be made safe, however, by the proper application of heat. There are two terms applied to the results of heating milk, pasteurization and sterilization. These two terms must not be confounded; the former is a process that requires the application of a much lower degree of heat than is effective for the latter. Sterilization means the killing of all the germs that may be present in milk. Pasteurization means the destruction of the disease germs that are of more common occurrence in it, such as those of tuberculosis, typhoid fever, diphtheria, etc. The investigation of General Sternberg, confirmed by Dr. M. J. Rosenau, especially, have shown that the common or pathogenic bacteria are unable to retain their life and virulence when they are exposed to a temperature of 60 C. or 140 F. for a period of twenty minutes, and that the value of milk as an article of food is not perceptibly affected by the designated temperature. Professor Kastle, of the University of Virginia, after extensive investigation, concluded that the designated temperature, maintained for a sufficient time to destroy the disease germs of common occurrence in milk, has no deleterious effect on its nutritive value. Thousands of

children under the eyes of careful and competent observers have been reared successfully on milk so treated without the slightest signs of scurvy or rickets. Rowland G. Freeman has recently shown that such outbreaks have been traced to mixed feeding; that milk was an insignificant factor. His observations were strengthened by those of numerous observers in Europe. There boiled or sterilized milk was almost exclusively used. The temperature required for sterilization does destroy the enzymes and impair the nutritive value of milk. This emphasizes the necessity for a proper appreciation of the processes of pasteurization and sterilization.

It must be kept in mind that the advocates of pasteurization do not countenance the use of unclean or old milk; on the contrary, they insist that pasteurization should be applied, but simply as a measure of safety against the dangers from milk which no other precautions can obviate. Furthermore, pasteurization should be practiced under proper supervision, and that form of so-called pasteurization which is to some extent commercially practiced, during which milk is heated to an unnecessarily high temperature for barely a fraction of a minute, should be emphatically discountenanced. Health officers should be provided with properly equipped laboratories to keep constant check on the output of pasteurizing plants. Progressive men engaged in the distribution of milk, cream, and ice-cream employ skilled bacteriologists. There are two noted instances in Washington where this precaution has been taken. The rarity of typhoid fever amongst the customers using this pasteurized milk and ice-cream has been marked. All milk, whether pasteurized or not, should be consumed as soon as possible after milking.

It frequently happens that properly pasteurized milk cannot be secured on the market. The observance of the following directions for the home pasteurization of

milk, by L. A. Rogers of the Bureau of Animal Industry, can then be practiced:

Milk is most conveniently pasteurized in the bottles in which it is delivered. To do this use a small pail with a perforated false bottom. An inverted pie-tin with a few holes punched in it will answer the purpose. This will raise the bottles from the bottom of the pail, thus allowing a free circulation of water and preventing bumping of the bottles. Punch a hole through the cap of one of the bottles and insert a thermometer. The ordinary floating type of thermometer is likely to be inaccurate, and if possible a good thermometer with the scale etched on the glass should be used. Set the bottles of milk in the pail and fill the pail with water nearly to the level of the milk. Put the pail on the stove or over a gas flame and heat it until the thermometer in the milk shows not less than 150 nor more than 155 F. The bottles should then be removed from the water and allowed to stand from twenty to thirty minutes. The temperature will fall slowly, but may be held more uniformly by covering the bottles with a towel. The punctured cap should be replaced with a new one, or the bottle should be covered with an inverted cup.

After the milk has been held as directed it should be cooled as quickly and as much as possible by setting in water. To avoid danger of breaking the bottle by too sudden change of temperature, this water should be warm at first. Replace the warm water slowly with cold water. After cooling, milk should in all cases be held at the lowest available temperature.

This method may be employed to retard the souring of milk or cream for ordinary uses. It should be remembered, however, that pasteurization does not destroy all bacteria in milk, and after pasteurization it should be kept cold and used as soon as possible. Cream does not rise as rapidly or separate as completely in pasteurized milk as in raw milk.[11]

CONCLUSION

If the lessons taught by these observations be heeded, a great step will be made toward the control of milk-borne infections. Dollars spent by the thousand for prevention will save millions needed for the care of those afflicted with disease, to say nothing of the days of suffering that will be avoided.

11. Circ. 152, Bureau Animal Industry, Dept. of Agric.

It can no longer be doubted that dairy products—and this term includes milk, cream, ice-cream, butter and cheese—are excellent vehicles for the dissemination of pathogenic bacteria. Outbreaks of typhoid fever, scarlet fever, diphtheria, sore throat, and intestinal disorders of children have been definitely traced to contaminated milk. The proofs of the danger of tuberculous infection from these products are accumulating daily. The opportunities for such infection are manifold. With the greatest vigilance on the part of trained inspectors and the greatest care on the part of the householder this infection cannot be entirely prevented. The householder also has a duty to perform to protect milk from contamination after it has been delivered.

Of course the carrying out of the recommendations for the production and delivery of more sanitary milk entails additional expense at the farm and the city depot. But the receipt of a single additional cent for a quart of milk would justify many improvements by the producer and the seller. A single case of sickness or a funeral resulting from contaminated milk would cost far more than the slight additional price of better milk for a long period.

Under these circumstances there should be no question about demanding that milk should be produced under conditions that would entitle it to be entered under Class 1 (certified milk) or Class 2 (inspected milk) as prescribed by the Washington Milk Conference; or, in case it does not conform to the requirements for these classes, that it should be efficiently pasteurized (Class 3). This classification, prepared by Dr. A. D. Melvin, Chief of the Bureau of Animal Industry, and approved by the Washington Milk Conference, is more fully described in Circular 114 of the Bureau of Animal Industry already referred to. It is a classification that will give us, not bad, indifferent and good milk, but good, better and best milk. To produce milk under any of these classes rigid inspection is required.

The prices that must be charged for the first class make it almost impossible for the man of moderate means to avail himself of such milk. Class 2 can be produced at a lower price, but would still cost more than ordinary milk. Hence the masses must resort to the milk of Class 3. With the precautions suggested, they would reasonably be assured in the use of this milk of a safe and wholesome supply at but a trifling advance in the price.

Those who are interested in the improvement of the milk supply and who wish to obtain a comprehensive summary of facts bearing thereon, are advised to write to the Secretary of Agriculture at Washington, D. C., for a copy of Circular 153 Bureau of Animal Industry, issued April 28, 1910. The title of the circular is "The Dissemination of Disease by Dairy Products and Method of Prevention."

Stoneleigh Court.

ABSTRACT OF DISCUSSION

DR. WILLIAM C. WOODWARD, Washington, D. C.: After searching for a proper basis on which to determine whether or not we have achieved any substantial results through our milk inspection service, I selected deaths from diarrheal diseases only, among children under 2 years of age, and it is to those alone that the chart exhibited by Dr. Magruder relates. It is true, as Dr. Magruder says, that the method of milk inspection in use in the District of Columbia was original with a committee of the medical society of the district, on which committee I had the honor to serve. Working quite independently of anything that had been done previously, so far as we then knew, we devised it. Later, however, it came to my attention that as far back as 1873, the three food inspectors who were then doing duty in the District of Columbia had united in a formal report to the then board of health recommending this very method of inspection. This proposed method included not merely the inspection of the farms by the inspectors in the service of the then existing board of health, but included also the permit system, whereby one city or one state can control the situation outside of its territorial jurisdiction. Later, about 1884, one of my predecessors actually inspected some of the dairy farms supplying milk to the district. I mention these things so that honor may go where honor is due. Had these early workers had back of them such public sentiment as was created by the publication of the admirable report of Dr. Magruder's committee, that first pointed out the probable

sources of typhoid fever in the District of Columbia, their work would doubtless have continued. As it was it died utterly, even its memory having passed from the public mind.

DR. WILLIAM H. WELCH, Baltimore: I think that a model demonstration exhibited in the national capital is significant and impressive, and likely to be productive of results to the rest of the country. Of course, we all realize, I think, that sanitary problems connected with milk are about the most urgent and perplexing, in many ways, of solution, of any. Some years ago in Baltimore we had made an endeavor, at least, to start the same sort of a campaign of education of the public regarding milk that we had attempted in regard to tuberculosis. It may not be known to all that the first tuberculosis exhibit was that arranged by Dr. Fulton in Baltimore. It was a great success there, far beyond any thing we dreamed of; and since then it was adopted elsewhere; but give him credit for that. We have attempted to do the same thing for milk, but it has not had the same response; but I think it is a good idea, and that possibly the time is now more suitable.

It may be that the large mortality in the hospitals is due to the poor quality of the milk used there; but there is a question whether the high mortality of those particular hospitals is due to the milk.

DR. B. FRANKLIN ROYER, Harrisburg, Pa.: Members of this Section might be interested in the educational campaign undertaken by the Department of Health in Pennsylvania. Three years ago our health officers, the men who institute quarantine for us, placard and disinfect premises, etc., were trained for dairy inspection by placing suitable literature in their hands and by having them further instructed by the county medical inspector under whom they work.

At the present time all dairy farms in the commonwealth are inspected twice each year. In our winter inspection completed some time in March we reached a total of 55,000 farms and stables producing milk for sale to creameries, condenseries, cheese factories, wholesalers, retailers and for sale from individual dairies. The inspection up to the present time has not, of course, been done with the great detail practiced at Washington, and it in no way interferes with towns and cities that have already some system of inspection of their own. In fact, it is a campaign intended to reach the men who are handling the cows and stables and caring for the milk in the country. After the inspection is made circulars are handed these men describing conditions that should exist, emphasizing particularly the need for cleanliness of cows' flanks and udders, the need for excluding all forms of dirt from the milk and the importance of cooling it at once.

We are now sending letters to each producer calling attention to the insanitary conditions found. This work reaches

far back into the country district where the initial infection of milk commonly begins.

We have a statute which makes communicable diseases reportable, typhoid included. On receipt of such report telling us of the existence of typhoid, diphtheria or scarlet fever on a premises from which milk is sold, our county medical inspector at once visits the premises and establishes the department's regulations for the control of the milk-supply. If such regulations cannot be established, the sale of milk is stopped or the stock is transferred to a neighboring farm.

DR. WILLIAM EDWARD GRANT, Louisville, Ky.: As has been suggested, we look up to Washington; what governmental authorities order and advise has great influence throughout the entire country. I am acting as health officer for my city, and we are much interested in what Washington tells us. Through such influence, in part, we have been able to get every cow that produces milk for the city I live in tuberculin-tested. We had a hard fight to accomplish this and it took six to eight months of very earnest and constant endeavor. The health officers of the state first issued an order that no milk should be sold in our state that did not come from tuberculin-tested cows; and then the city health officer wrote a letter to each dairyman who sold milk in Louisville, telling him that after a certain date no milk would be permitted to be sold in our city that did not come from a tuberculin-tested cow.

At the same time an order was given that no new cows should be brought into the herd, unless they were tuberculin-tested, and that the dairymen should clean up their dairies and disinfect them according to methods suggested by the government at Washington. In that way we have improved the milk-supply wonderfully in our city; and have also interested our dairymen in keeping it improved. The education to them has been of great value. The fact is, I believe, the dairymen usually are glad to improve bad conditions, if we tell them how. They didn't know how; and they welcomed somebody who would come and say "This is wrong; and this is the way to correct it." Now we have dairy inspectors go to these dairies and see that the cows are properly curried, and the udders properly washed before they are milked, and the milk taken to a separate place and cooled; and we try to persuade our dairymen to bottle it at once and bring it to market in that way.

I think that bovine tuberculosis is very dangerous to children, but not dangerous to adults. The children in the hot weather are a good deal run down, no doubt, by the heat; and the germicidal power of the blood being lower, the germs find easy access and a location in the alimentary canal of infants, and in that way they become diseased. That is avoided in part by having none but pure milk distributed. "The Babies' Pure Milk Fund" is doing a good work with us, and we have

also pasteurized and certified milk, and in this way see that the babies get only the best.

DR. SENECA EGBERT, Philadelphia: A few years ago, when the newspapers of New York were advocates almost universally of pasteurization of the milk, if I remember rightly, Dr. Darlington, of the board of health, opposed pasteurization at the dairy, the objection being that it gave the consumers a false sense of security, since a considerable period elapsed from the time the milk left the dairy until it reached the consumer, and there was the possibility that in the time of transit the milk might be contaminated, especially if carelessly handled. It does seem to me that that objection can be made a very strong one—that the milk can be pasteurized, and yet, if the way be left open for careless handling on the part of the train men or the dairy dealers in the cities, that there is chance for danger there.

Another thing that I am glad Dr. Magruder mentioned was the fairness of giving the dairymen and milkmen—the producers—a higher price for the milk. It is unfair, it seems to me, for us to advocate this better milk, unless we are willing to pay for it. Any man who knows anything about farming, knows that it is a pretty hard thing to provide the things demanded—sanitary barns, good stock and all that—and then to get no more than 3 cents or thereabouts for the milk. We must educate the public to allow a higher price for the milk—see that they understand that that don't come into the category of things to be cheapened in the attempt to reduce the high cost of living. The question of inspection is the big question and I believe that we have yet to appreciate that in most of our large cities the cost of inspection is apparently prohibitive. It ought not to be, but we are not getting—at least, as far as the municipalities are concerned—as much inspecting nor as many efficient inspectors as we should have.

DR. G. LLOYD MAGRUDER, Washington, D. C.: First in regard to Dr. Woodward's observation, I do not claim paternity of the idea of the inspection and permit system. I did claim and do claim that the report of the committee of 1894, embracing recommendation 9, quoted by me, directly caused the passage by Congress of the law giving this authority to Washington. Hence I think it is justifiable to claim the honor of being instrumental in the initiation of inspection.

As to Dr. Welch's observation, I said bad milk was *probably* the cause of the high death rate in hospitals. The lowest rate occurred where little milk was used. It is a great satisfaction that Dr. Welch has corroborated the statement that bovine tuberculosis causes from fifteen to twenty-five per cent. of certain cases of tuberculosis in children under five years of age.

In answer to Dr. Egbert's question, pasteurization should take place in the city under official supervision. I spoke of 50° F. as the danger line because of the rapid growth of bac-

teria in milk above this temperature. This prompts me to mention the desirability of investigating the effects of freezing milk. I shall promptly take up this question with the Secretary of Agriculture. Three years ago the United States Consul at Chemnitz reported to the State Department that a German physician had recommended the transportation of milk in frozen blocks, since no deleterious influence was exerted by freezing. American officials caution against allowing milk to freeze. These divergent views interested me at that time. I sought without success to have them investigated at the Hygienic Laboratory. General Sternberg, chairman of one of the committees at the Yorktown Exposition, awarded first premium for milk to the Virginia Polytechnic School at Blacksburg. This milk was delivered partially frozen, after transportation 400 miles in jacketed cans.

The influence of this Section since 1907 on the milk problem has been so great that I thought it desirable to report what has been done in Washington. The symposium at Atlantic City in 1907 on the milk supplies of several cities received marked attention. The paper which I read at the symposium contained observations made by officials of the Bureau of Public Health and Marine-Hospital Service, of the Department of Agriculture, of the Health Officer of Washington, and of citizens in private life. Much enthusiasm was manifested at the information, which showed that the government authorities were so interested in milk and water supplies.

I had seen Mr. Loeb, Secretary to President Roosevelt, before I left Washington. Mr. Loeb stated that the President was opposed to a department of public health, but was heartily in favor of a bureau. On my return to Washington I saw President Roosevelt and reported the proceedings of the Association on public health matters. He showed marked interest. He directed the investigation of the milk supply as requested in the letter introduced in my paper. Many other valuable investigations along this line have been conducted since then by the government. Much of this interest is directly due to the impetus given to the movement in this section in 1907.

THE RÔLE OF OPHTHALMOLOGY IN PREVENTIVE MEDICINE

HIRAM WOODS, M.D.
BALTIMORE

The rôle of ophthalmology in preventive medicine includes, it seems to me, at least three phases which may be profitably studied by the general profession: 1. Prevention of blindness from infectious diseases and accidents. 2. Prevention of eye deterioration by violation of ocular hygiene. 3. Prevention of remote lesions through recognition of early ocular symptoms of systemic disease. It is my purpose to speak briefly of each of these, bearing in mind the fact that this section has to do rather with the practical results of scientific study than with the details of the study itself.

OPHTHALMIA NEONATORUM

Among infectious eye troubles, the most destructive, by long odds, is ophthalmia neonatorum. The number of its victims is little short of a professional disgrace. Its cause is definitely known. While due exceptionally to infection other than gonococcic, and while differential diagnosis is important, the fact remains that clinical experience shows the preventability and curability of the disease. Credé's prophylaxis was given to the profession about thirty years ago. On account of occasional so-called "silver catarrh," it encountered some opposition. This was largely overcome by reducing the strength of the nitrate solution from 2 to 1 per cent., in which strength it seems equally effective as a preventive, while its irritating qualities are lessened. Rarely—not more

than twice or thrice in a lifetime—hemorrhage from the conjunctiva is seen in infants. As the use of Credé's method became more general, this symptom of hemophilia was laid at the door of the silver salt, hemorrhages, usually fatal, from other parts of the body not receiving proper consideration.

Other preventives have been tried. Maternal disinfection has been relied on; other drugs mercuric chlorid, potassium permanganate, and the protein silver salts, have been used in the eyes. While all have been more or less effective, the consensus of opinion puts the 1 per cent. nitrate solution at the top. When used properly, in a clean way, this solution is practically always effectual. Its routine use in maternities has almost driven this disease away. "Routine" is important, for whenever discretion has been left to a house staff, to use or not according to maternal conditions, ophthalmia has increased. Though it is always used in most maternities, and employed by many obstetricians uniformly in private practice and by many more when there is the least reason to suspect gonococcic infection, one studying statistics of blindness meets with an appalling fact; the percentage of blindness from infantile ophthalmia in schools and asylums is practically undiminished. In some places it is larger. The Maryland school will serve as an example. In 1892 children blind from this disease amounted to about 18 per cent. Now it is nearly 28. An average of 30 per cent. holds everywhere. These cases do not come from maternity hospitals or from eye hospitals, provided the cornea is clear when treatment is instituted, nor from the private practice of the careful physician. In my own state, of this 28 per cent. of all blind children, 77 per cent. were born under midwife care, the remainder under medical care. Observations in other states give similar results. Several conclusions are justified:

First, an increasing number of women in the poorer classes are applying to midwives for care during con-

finement. This seems directly confirmed by the investigations of Miss Crowell in New York and Chicago, and Miss Small in Baltimore. Birth registration is hard to enforce; but an estimate of 40 to 50 per cent. of midwife attendance is certainly safe. This is in spite of the ample hospital provision which our cities afford.

A second conclusion is that the large majority of midwives are ignorant and incompetent. It is necessary only to call attention to Miss Crowell's findings to prove, not only that the American midwife, white and black, is untrustworthy, but that the foreign woman, better trained in her own country, soon degenerates to the level of demand when she comes to our side.

A third conclusion, more mortifying and disgraceful than those bearing on midwives, follows from the fact that at least a considerable percentage of infantile blindness can be laid at the door of the physician. There are, it is evident, practitioners who either do not know how to prevent and treat the disease, or, if they know, fail to act on their knowledge. It is well-nigh impossible to reach these men. Medical societies and journals are strangers to them. They pursue their own dogmatic, complacent ways, and their patients take the consequences.

But the midwife problem is one which must have serious study. In many countries of Europe the midwife has not only legal restrictions but educational advantages Her activity is recognized, and the government prepares her for her work among the poor. Not so, to any degree at least, with us. We so often hear it stated that the midwife is here, and here to stay, that it must be true. That 40 or more per cent. of births are supervised by her lends confirmation. She is evidently more popular with the poorer classes than are our hospitals, maternities or relief societies which furnish medical attention by women physicians, free of charge. Yet we know that her ignorance often brings blindness to the baby and death to the mother. Preventive medicine means prevention

of the effects of disease; elimination of cause, when possible.

We have recently added to our Maryland laws one regulating the practice of midwifery. It requires ability to read and write, attendance on at least five cases of confinement, under capable supervision, and demonstration to the health board of ability to attend normal labor. It requires report, and forbids treatment of infantile ophthalmia. This law, and others similar, aims at making the midwife as harmless as possible, recognizing her standing, because she is a necessity.

If that is the professional attitude toward her, it seems to me that we must go the full length of the situation, and provide, as is done abroad, for education of the midwife up to her legal privileges. She has a unique place. Her patronage can never rise above a certain social line, and persons below this line do not know how to take care of themselves. Naturally they become, in one sense or another, public charges. I do not mean that they must be supported; but I do mean that their ignorance leads to results from which intelligent men and women must save them. How and by what means the midwife is to obtain educational facilities I do not, at this time, at least, stop to discuss. But, on the doctrine of her necessity in American life, it is worth thoughtful discussion, and such a group of men as make up this Section will soon have to grapple with it.

I am going to suggest, however, a side attack on the midwife problem. It is popular education of the persons who employ the midwife. We have in the Maryland Medical and Chirurgical Faculty a bureau of public instruction. Medical men and women go, at the request of philanthropic societies, among the poor and tell them about prevention. Last Fall I addressed an audience of some sixty or more pregnant women under the auspices of a branch of the Women's Christian Association. I afterwards learned that a number of my audience canceled midwife retention, and entered hospitals. I have

urged this popular education on our social workers in Baltimore, and mention it here only as suggesting a way of enlightening the ignorant poor who are quick enough to follow advice when they are convinced of its disinterestedness. They will not take such advice from physicians in this spirit.

The fight against ophthalmia neonatorum is the most encouraging preventive undertaking in the rôle of ophthalmology. Many states have laws compelling the report of midwife cases, and a few convictions impress midwives with the necessity of getting the babies into proper hands at once. Such has been our experience in Baltimore, where some of us have reported neglected cases and secured convicitions. In New York state the Board of Health furnishes free of charge prophylactic sterile silver nitrate solution to those willing to use it. A large number of physicians and the better class of midwives are doing so. The Sage Foundation has taken up the fight, and is ready to furnish money and help promote knowledge where it is needed. In several states there are associations of professional and lay men and women for prevention of blindness. The American Medical Association has a special committee in its Section on Ophthalmology, of which committee Dr. Lewis of Buffalo is Chairman; and there are corresponding members in each state.

There is still needed the same sort of awakening to this disease which has come to the profession in the fight against tuberculosis. Why the mere facts in the case fail to impress many physicians is hard to say; but they do not. I heard a leading county practitioner say that he considered putting nitrate solution into the eyes of a new-born baby, "just because the father had had gonorrhea," as almost criminal. One step might be taken in impressing such men if ophthalmia neonatorum were put in the list of diseases to be reported. It could be easily enforced after a little; for if a child lost an eye the parents would almost certainly take him or her to an

oculist, and thus failure to report would be brought home to the first attendant. Such a lesson would induce a man to post himself on treatment and prevention.

ACCIDENTS

Accidents as a cause of blindness have been gone over so thoroughly that I shall hardly more than allude to them. In the line of prevention, however, a sane and safe method of observing Fourth of July merits professional activity. Since passage of an ordinance forbidding the use of fireworks within the city limits, such accidents as we saw in abundance years ago in Baltimore, are now almost unknown. Dr. Robert L. Randolph deserves special mention for activity in this work. The comparison between cities with and without such regulations, as produced by *Collier's Weekly* a year ago, shows what can be done if medical influence is used. Antiseptic treatment of eye wounds from industrial accidents has saved many eyes whose sight was not entirely destroyed, though in former years these eyes would have been removed without hesitation. Sympathetic ophthalmia is now a rare disease. Personally I have seen but one case in a number of years; yet risks which would have been formerly considered unjustifiable, are now taken to save the injured eye.

The principles of treatment are, removal of foreign bodies, if present and removable, rest, cleanliness, cold, and meeting complications with appropriate treatment. Some surgeons claim that hexamethylenamin is highly useful in such cases, and a limited experience with it leads me to agree with them. The most important thing is to get the patient under rigid antiseptic treatment early.

It would be interesting to review, if time permitted, various protective devices now being introduced in factories to safeguard workmen from flying bits of metal,

broken machinery, etc. This phase of the prevention of blindness, however, belongs rather to the industrial than the medical side.

SCHOOL HYGIENE

There is a rôle of preventive medicine in ophthalmology which has received considerable attention from some quarters and has been sadly neglected in others. I allude to school hygiene. The systematic examination of children's eyes for visual acuity often discovers for the first time that refraction is abnormal and enables the child to start school life safe-guarded. General recognition of ocular origin of headaches, etc., does more in the same direction. Recognition that myopia, certainly the progressive type, is a diseased condition, and that it usually comes from neglected astigmatism, is a long stride in saving children from damaged eyes and the numberless remote disturbances which come from the eyes.

Of no less importance than examination of pupils' eyes is school hygiene in the sense of proper lighting of rooms—direction, intensity, etc.; adjustable desks, size of print, character of paper, etc. In such a paper as this it is hardly possible or proper to consider these matters in detail. Yet, with increasing popular interest in medical matters and greater appreciation of hygienic principles, such things demand attention from the physician, because his advice will be sought.

Two phases of school hygiene may be specially mentioned. The adjustable desk, as is known, can be adjusted to the child's measurement. Its use does away with the haphazard method of putting a child in the desk which most nearly fits. It secures comfortable seating, with the body properly supported both in the upright and forward positions, enables the child to bend over the desk, in writing, without elevating one shoulder above the other, and with the page at a proper distance for sustained and comfortable eye work. These desks are not

much more expensive than the old-fashioned stationary affairs. They are in use in most of the best private and a few of the public schools. Their universal adoption would, I believe, be most helpful in preventing ocular discomfort and disorders.

Every year an oculist sees a few children with these conditions: vision is below normal, one-half to one-tenth; the child sees well enough to be self-reliant, but study is impossible; either refraction error is absent or its correction does not improve vision; the cause of defective sight is sometimes undiscoverable, apparently a congenital defect. Again, corneal opacities, antipolar cataracts, old superficial chorioidal scars explain the partial blindness. What can be done to educate these defectives? If they try to keep up in a curriculum arranged for children with normal visual acuity, not only does suffering result, but each year sees a little less vision at 20 feet, a little nearer approach of print in order to secure a larger retinal image. In other words, school life is damaging sight.

I, like other oculists, have seen such cases go on to practical, if not absolute blindness. We forbid eye-work, but the prohibition means enforced idleness while the mind is active. A few such children consent to be read to, but the majority rebel, and little by little parents cease the effort. Then either eye-work is done clandestinally, or effort to get education is abandoned. So far as I know, there is no provision made for such children in our educational system. With most of them it is either nothing or the blind school. There has been some recognition of this class in England, and a few men have, in individual cases, done something here.

We need, it seems to me, a midway or modified curriculum in our school system. It should include such studies only as are really necessary for a fair common school education. Maps, diagrams, books, etc., should be large enough in outline or print for the defective to see without effort. I have been able to find a few such maps

and books for such children, and the effect of eye-work, under easy conditions, on the eyes themselves, has been surprising and gratifying. Visual acuity has really increased during a period of years.

The principle holds good, too, in a class of squint cases which relapse after operation because the squinting eye is below its fellow in visual acuity and so does not work: that is, its comparatively indistinct retinal image makes no impression on the psychic side of seeing. By selecting type which the eye can see, and forcing work on such type, with the good eye excluded for a little time each day, one is often rewarded by positive increase in vision, sometimes to a point where binocular sight is possible. I have developed such eyes from one-tenth or less to nearly normal.

But it is chiefly to the school idea that I wish to direct attention. Ophthalmology here has a rôle in preventive medicine of both physical and economic value; for not only is such sight as the child has, preserved or improved, but the child himself is made a more or less productive social factor. He will not, with visual acuity assumed, take kindly to instruction designed for the blind, but he will respond to the special efforts made for him. As a class, he merits more attention than he gets.

EYE LESIONS AND SYSTEMIC DISEASE

In conclusion, I want to speak of a rôle in preventive medicine which ophthalmology ought to occupy more than it does. I allude to functional or organic ocular disorders as symptomatic of systemic disease. To the oculist it is important because the best possible work in his own special line will be nullified unless he recognizes the symptomatic meaning of the trouble bringing his patient to him. To the patient it is important, because even if the oculist relieves symptoms without recognition of cause, relapse is inevitable. To the practitioner it is important because the eye, properly studied, often gives indications not gathered otherwise.

There are many ways in which this rôle may be illustrated. How often does a patient go from one oculist to another—to say nothing of the all-sufficient examining optician, or optometrist, as he now calls himself—vainly seeking relief from asthenopia? The mere fact that a half dozen conscientious and capable men have failed should indicate that there is something besides ocular error. This something is often hard to find. Its search demands cooperation of specialist, internist, physiologic chemist, etc. I have traced these persistent functional eye disorders to anemia, incipient and unsuspected nephritis, intestinal auto-intoxication, functional and organic menstrual troubles, supposedly cured or unsuspected hereditary syphilis, etc. Again, the oculist sees interstitial keratitis, or a frank iritis of alleged rheumatic origin; or else it is clearly a secondary syphilitic manifestation. His duty is not done when the eye lesion is cured. Only when he has put the patient where he can receive the systemic review or treatment indicated by the eye symptom can the oculist release himself from responsibility.

On the other hand, the oculist is now, the country over, fighting the so-called optometrist in his effort to secure by legislation a quasi-professional standing. He is doing this disagreeable work because he knows that not only is the eye itself often injured by delay of proper treatment, while the optician is vainly trying to sell glasses that will cure ocular lesions, but that the symptoms of eyestrain which take the individual to the optician often mean remote and serious troubles. The rôle of ophthalmology in preventive medicine means cooperative medicine. It means that if we view the eye from the standpoint of its own function, this function is often affected by conditions beyond the oculist's power to diagnose or cure; that if ametropia be present, the physician may work in vain to relieve remote symptoms till the oculist helps him; that if the oculist appreciates the meaning of persistent functional disorders, a rigid pupil, seemingly unimportant muscular

paresis, he may save his patient from dreadful consequences by asking his brother internist to aid him; that the problem of saving sight is not one which concerns the oculist alone, but is one which demands honest introspection from the physician and effort to educate his patients in the views which medical progress has taught us.

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ABSTRACT OF DISCUSSION

DR. LEARTUS CONNOR, Detroit: Dr. Woods has stated with great clearness the relation of ophthalmology to preventive medicine. But in order to make this relation effective it is necessary that every physician have a definite increase in his working knowledge of ophthalmology. What this shall be and how obtained, is the subject of my remarks. The Section on Ophthalmology has decided that this shall be "a mastery of infectious diseases of the eye" and its "simple refractive defects." Because of the fact that existing ophthalmologists are unable to meet the needs of the one hundred and eighty millions of human eyes in the United States that need refracting, it is proposed that the entire one hundred and thirty thousand physicians be trained to manage simple cases, leaving for specialists the more complicated cases. Using the illustration of an army, we now have the officers, but not the soldiers; it is proposed to recruit the soldiers, and so to organize an effective army for protecting all the people from ocular diseases and disabilities.

If the entire profession is to be trained for the intelligent management of the simple eye disorders, the medical colleges must train them. To encourage them to make such changes as are necessary to ensure such training, it has been found practicable to persuade the state registration boards to require it for license to practice. A year ago the Section on Ophthalmology appointed a committee to promote such persuasion. It reports that four states now make such requirements, viz., Michigan, Utah, Vermont and Nebraska; that the House of Delegates of the American Medical Association, the American Academy of Medicine and the Federation of State Licensing and Examining Boards approve it.

Thus in one department of medicine—ophthalmology—experts have determined what every physician can master and actually practice, without interference with other practice, and so supplement the limitations of specialists and enlarge their own field and supply educated physicians adequate for the ophthalmic needs of all the people, under actual conditions. Farther, it is promoting the actual equipment of every doctor with the skill needful for him to do his part in the service of

the people. It is believed that thus the service of ophthalmology in preventive medicine will be infinitely enhanced, just as an army of one hundred and thirty-five thousand is more effective than one of three thousand, and one with both soldiers and officers stronger than one with only officers.

DR. PRINCE A. MORROW, New York: I believe that the gonococcus is responsible for 90 to 95 per cent. (a great many authority say practically all) of the blindness of the newborn. We have the testimony of ophthalmologists that the gonococcus is responsible for at least 25 per cent. of all blindness. Now, I think that in all these discussions on the prevention of blindness, as fas as I have followed them, in the literature put out by the committee on the treatment of blindness, such as "Why Children Need Not Be Born Blind," there is no reference to the education of the public as to the nature and communicable mode of the infection that causes blindness; that is absolutely covered up and concealed; in fact, the entire responsibility is thrown on the shoulders of the physicians and midwives. The only education that the committee attempts to give is the education of the public to an appreciation of the value of the Credé method. As long as the public is ignorant, and kept ignorant, of the nature of the infection that causes blindness, I don't believe that ophthalmia neonatorum will ever be effectively checked. Now, I am a believer in the value of the Credé method; it is the best method in the present state of our knowledge for correcting the effects of this cause; but I regard it as an anachronism in the present day of advanced medical science to endeavor to correct the effects of a cause and ignore the cause itself.

Now, how do we get at this? We are to educate the public, but we cannot do it individually; we cannot say to a mother that her child has been blinded by an infection received from its father; but we can educate the public collectively. The medical secret does not apply to the collectivity, it applies only to the individual. I believe that it is the greatest duty, the most urgent obligation on the part of the medical profession of the present day, to enlighten the public in regard not only to this infection, but to all of the infections that come from venereal diseases.

DR. SENECA EGBERT, Philadelphia: In regard to the teaching in the medical schools, I would like to say that, as a matter of fact, some of the students in some of the schools, are getting this information and instruction, not only didactically, but also by actual practical work in the ward class. This year I can tell you of a class, numbering eighty at least, every one of whom had practical work in ophthalmoscopy, as well as work with other ophthalmic patients; and, what is more, those men got in final examination a question on refraction. I might say, too, in regard to the examination on

ophthalmology, the question on the treatment of ophthalmia neonatorum has been so common in the past years that the students always look for it; and if they don't know anything else about the eye, they do know Credé's method and how to treat new-born infants. That is being done not only in our own school but in other schools throughout the country.

DR. HENRY B. HEMENWAY, Evanston, Ill.: The Chicago Department of Public Health has been conducting, for a short time, what they call a postgraduate school of instruction for midwives. A series of questions is sent out to the midwives, and they are asked to reply to them, and then they are invited to come in and discuss some of those problems with one of the department members. One of the objects of this instruction is this very matter of the prevention of blindness of children.

DR. W. FORREST DUTTON, Carnegie, Pa.: There are three problems presented by Dr. Woods' paper: that of midwife, that of ophthalmia neonatorum, and that of registration of births. I think we should, in the first place, educate the laity to legislate. In Pennsylvania we practically have no midwife law at all; and of those that attempt midwifery, we only have one of those licensed out of about the ninety-nine of those that do the work. I will venture to say that 25 per cent. of the ophthalmia neonatorum is due to the negligence of those practicing midwifery who have no right to practice it at all. Therefore, the blame should be placed where it justly belongs—on the midwife and the laws and not on the physician.

That presents another problem of the registration of births. It may be said that we get back to that when the death certificate is brought in. Well, if those children are allowed to go on until four or five years of age without registration they don't have an opportunity to get back at a midwife. If they would get at the midwife, make the doctor, midwife and parents equally responsible for the registration, I think a great many cases of blindness from these conditions could be avoided. It is legislation, instead of education, in a great many places, that we want. We must educate the legislators to know that we want this, before we educate the classes up to the standard in preventive measures.

DR. HIRAM WOODS, Baltimore: I agree with Dr. Morrow's general criticisms that an allusion to popular education along the lines of sex hygiene would have made my paper more complete. It was not forgotten, but it is impossible to put in a short paper all one may wish. In the general lectures delivered in Baltimore, under the auspices of the medical and chirurgical faculty, the matter is emphasized. I agree with Dr. Egbert, so far as my experience goes. If my students get away from instruction on eye diseases without realizing that between the eye and the sex problem there is

close connection, without appreciating the fallacy of one standard of morality and decency for men and another for women, it is not because such instruction is not given them.

Dr. Morrow claims that advice of ophthalmologists and obstetricians (that Credé's method be general) necessitates the logical deduction that every woman is a possible source of gonococcic infection. The thousands of babies who do not have ophthalmia is sufficient proof of the absurdity of such deduction. If statements from the father about his previous life can be relied on, an eye prophylactic can be safely omitted. But, with different standards for the sexes, we must recognize the possibility of undiagnosticable gonococcic lesion. And responsibility for risking the baby's eyes rests on the medical attendant. How often does the average practitioner ever think of latent gonococcic infection in this light? After possibly two or three children escape, a baby develops ophthalmia. Recent infection in either parent is excluded. What does it mean? It means that an old, forgotten infection was a source of danger to the baby's eyes. In view of the harmlessness of the prophylactic, it is believed that the moral effect or influence of general use of prophylaxis would induce men, who now do not think of it, to use it and thus save many eyes now sacrificed. By noting gross lesions in the mother, the child's danger cannot by any means be determined. There are physicians not belonging to medical societies, not reading journals, dogmatic, self-satisfied men, who seem beyond reach of new thoughts. They do not know, and the problem is, how to reach them. "There are others" outside of the medical profession, that is so. Post-partum infection, for instance, is most important. When a baby develops ophthalmia on the third or fourth day, you attribute it to maternal infection. How about those that come along later? I recently saw a baby blind in both eyes, the disease having appeared on the twelfth day. There was a dirty nurse, or dirty something, that blinded this child. Here is another problem in midwife training or public medical education. Obstetricians and ophthalmologists have begun their work on the midwife and careless doctor because they are the most conspicuous offenders, and most easily reached. No branch of preventive medicine can live to itself; but in practical, every-day work we must do what we can where we can. I fear it will be a long time before sex hygiene is so generally understood and acted on as to save babies' eyes. In the meantime, the indifferent medical man and midwife should be regulated.

THE RELATIONSHIP OF NEUROLOGY TO PREVENTIVE MEDICINE

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The neurologist is concerned with a branch of internal medicine which at first sight does not appear to have have much relationship to public health, but, in reality, not only does such relationship exist; but it is a very intimate one. Though public health seems to concern itself with sanitation and pure food, epidemics and health-menacing noises, public hygiene is in reality, public education. Its aim should be to teach people, not only how to live long, but how to live happily, and my first contention is that, until the present time, preventive medicine has concerned itself exclusively with the former, whereas, if the object and aim of life is the pursuit of happiness, personal and general, preventive medicine is but half accomplishing its purpose. Following its principles, we direct our efforts to stamping out diseases which kill, leaving unnoticed and unattacked those which maim and incapacitate. The victims of these often find life insupportable, and they not only menace the happiness of their families, but stain the escutcheon by the crime of self-destruction.

I shall attempt a discussion of the relationship of neurology to public health under two captions. First, our obvious duty in dealing with certain infectious diseases of the nervous system, and second, our privilege in attempting to overcome certain incapacitating mental states.

OUR DUTY

Certain infectious diseases of the nervous system, especially poliomyelitis and epidemic cerebrospinal meningitis should be considered reportable, quarantinable diseases. The former is not yet, so considered by many health boards; the latter, fortunately, is. The epidemic prevalence of poliomyelitis has been recognized for nearly twenty-five years, the first epidemic having been studied in Norway in 1887, and the second in Vermont in 1894.[1] Since that time, more than fifty epidemics have been carefully described. As the result of the investigation of these epidemics, and particularly of the epidemic that occurred in southern Norway in 1905, the epidemic in New York in 1907, and the epidemic in York County, Nebraska in 1909, we are now in a position to state that the disease is communicable; that contact with a person sick of the disease is not necessary that another person may contract it; that the period of incubation is from four to ten days; that the contagiousness of the disease varies with the epidemic, and that the mortality rate is liable to great variation, in some instances being as low as 5 per cent., in others as high as 46 per cent. In addition, we know that the seasonal occurrence is very extraordinary; that it occurs practically only in the warm weather; and that unhygienic surroundings, density of population and conditions of health have little or no bearing on the occurrence of the disease.

The experience of Dr. G. P. Shidler[2] of York, Neb., shows that the disease can be readily controlled by quarantine, and boards of health should be urged to place poliomyelitis on the list of reportable diseases and to formulate measures which may be quickly enforced to constitute the strictest quarantine.

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1. Collins, Joseph: The Epidemiology of Poliomyelitis, THE JOURNAL A. M. A., June 11, 1910, p. 1925.

2. Shidler, G. P.: The Epidemic of Spinal Disease in Nebraska, THE JOURNAL A. M. A., Jan. 22, 1910, p. 277.

We must bear in mind that it is an acute and infectious disease of the cerebrospinal axis and its covering, the pia, with a pronounced and inexplicible predilection for the gray matter of the anterior portion of the spinal cord, which it nearly always succeeds in affecting before its pathogenic impetus is satisfied. It affects the gray matter in one case profoundly, in another triflingly, and the symptoms that result in any case must, of necessity, vary with the intensity of the infection and with the portion of the cerebrospinal axis that bears the brunt of the lesion. The most important factor in stamping out the disease is that we learn to recognize it early and that we interpret correctly the so-called atypical cases. In many of the epidemics the experience has been that milder cases, and cases in which the paralysis was neither profound nor lasting, were looked on as cases of grip or rheumatism. I need not say that these mild and difficult cases are as potent to disseminate the disease as are the severer cases.

The necessity for quarantining epidemic cerebrospinal meningitis is generally conceded. Here we are dealing with a disease that fights in the open, as it were. We know the natural history of the *Diplococcus intracellularis*, we know its mode of entrance into the system; and fortunately, thanks to the brilliant investigations of Flexner, we are in possession of a serum which, given early and properly, is adequate to control the disease, and, in any case, to rob it of its terrors. More than this, epidemic cerebrospinal meningitis is a disease that either kills its victim or allows him to recover, while poliomyelitis nearly always maims, and pitiably so, those that it does not kill.

Other varieties of infectious nervous diseases that come within the scope of the neurologist are epidemic polyneuritis and pellagra. The former is of such rare occurrence in this country, save in our tropical possessions, and the latter is now having its natural history and pathology so carefully studied by those to whom the

opportunity is given, that I shall make only this cursory reference to them here.

Preventive medicine has not given the attention that it should to certain diseases of the nervous system that flow out of occupation and especially of occupation in foundries, blast furnaces and rolling mills. There is a widespread or generalized intoxication of the nervous system that occurs in bronze workers. It is not possible in every instance to say whether the disease is a neuritis, a myelitis, or an encephalitis. A patient that I have had recently in the Neurological Institute will best illustrate this point and will, likewise, indicate how necessary it is to apprise workers in such foundries of the dangers to which they are exposed.

A man, 47 years old, who had lived a continent, healthy life, and who was by occupation a foreman in a bronze factory, was sent to me from Bellows Falls with the diagnosis of pernicious anemia. His story was that in the winter of 1909 he had had two or three attacks of dysentery without attributable cause. Careful inquiry revealed that during the previous summer he had an attack of salivation, that his mouth had been sore, that his breath was extremely offensive, smelling of garlic, and that he had a craving for raw onions, an article of food which he had not been accustomed to eat. In July 1909, and some time after the third attack of dysentery, he noticed that he would often be stricken with uncontrollable drowsiness, while talking to his men in the shop, while sitting at table, while in church, etc. In addition to this, he became forgetful and stupid. About two months later, he first noticed a sensation of numbness and weakness in the extremities, phenomena that increased until he was wholly paralyzed. It was also noted that his speech became somewhat indistinct, and on two occasions he was incontinent of urine. After three months this paralysis began to disappear gradually, and when I saw the patient in March, 1910, he was able to walk with the aid of a cane and supported

by another person. The examination showed that there was no marked muscular atrophy. The station and gait and the purposeful movements of the hands were all ataxic. The knee-jerks, the ankle-jerks and the elbow-jerks were lively and the patient had the Babinski phenomenon (extension of the big toes on irritation of the soles) on both sides. There was no detectable disturbance of the various forms of sensibility nor were the special senses disordered. The pupils responded readily to light. Examination of the urine failed to reveal either arsenic or lead.

I interpret this case as an example of intoxication of the nervous system, the peripheral as well as the central, probably by arsenic, although it is quite possible that it was the result of more than one metallic poison. The odor of garlic that was attached to the breath, the ptyalism, and the attacks of dysentery, might all be accounted for by arsenic, but arsenical poisoning has rarely been followed by symptoms indicative of implication of the spinal cord and brain such as existed in this case.

The point that I particularly wish to make, however, is that workers in factories such as this should have their health safe-guarded.

There is a form of neuromuscular affection which occurs in workers exposed to high degrees of dry heat, such as stokers, puddlers, etc. Its most conspicuous system is what we neurologists call myokymia associated with generalized weakness. This condition has been studied by Edsall of Philadelphia, and I myself have encountered several instances of it. What its pathogenesis is, whether an intoxication by products developed within the system as the result of application of intense heat, or whether it is due directly to the heat, cannot as yet be said.

I purposely refrain from any discussion of the relationship of syphilis to diseases of the nervous system

and to the bearing of this problem on preventive medicine. Everyone knows that there are certain organic diseases of the nervous system that flow out of syphilis, and that, if syphilis were conquered, tabes and its twin, general paresis, syphilitic spinal paralysis, and syphilitic endarteritis and meningitis would cease to exist. Syphilis is a social evil which must be dealt with in some other way than by science. The dominant instinct of man will be appeased illicitly, so long as the race exists and so long as alcohol is used. Education will do something toward diminishing its frequency, but a small amount of alcohol, taken at one time, quickly inhibits the effect of education. My personal belief is that we must check the ravages of syphilis by an adequate cure properly administered.

OUR PRIVILEGE

An incalculable part of all the misery, suffering and incapacity in the world is contributed by those functional nervous diseases that are now commonly called the psychoneuroses. They are the diseases that furnish the pabulum on which the rank growth of supernaturalism in therapy, in the shape of Eddyism and Emmanuelism in this country, has occurred. They are the diseases on which the quack fattens; they are the diseases whose existence is a constant reminder of our inadequacy to give proof of the reason for our existence, namely to heal the sick.

We do not successfully combat psychoneuroses, hysteria, psychasthenia, obsessive and anxiety states, because we do not prevent them. We do not prevent them because we do not know their cause. We know that they occur in individuals of neuropatic and pschyopathic heritage, that is, in those whose ancestral endowment to resist strain and stress is below the normal, and we know that they are immediately conditioned in persons thus predisposed, by normal and physical trauma.

During the past few years, a theory or hypothesis of the causation of the psychoneuroses has been evolved and put forth by Freud of Vienna, which is deserving of the most careful investigation and consideration. Although it does not, at first sight, seem to concern the physician who devotes himself to preventive medicine, in reality, it does, for on him will devolve the devising of ways and means to prevent them.

The enormous importance of sexual factors in pathologic states as well as in normal conditions, has always been conceded, at least tacitly. It is Freud's merit to have opened up a wider vista into the delicate and hidden connections between the erotic element and nervous disease. His explanation of functional neuroses as the result of a mass of suppressed sexual desires has fallen like a bombshell into this era of sexual hypocrisy; and his ruthless application of the so-called sexual symbolism in all cases has naturally led to a strong, though by no means universal, reaction against the proposed remedy, psycho-analysis.

The question has been raised: Why should the sexual emotions alone, among the manifold equipment of the psyche, give rise to disturbances? In other words, why regard the sexual emotion as the root of all other emotions? In answer it may be urged that there is only one thing in life which is desirable and pleasing enough in itself to induce human beings to sacrifice all else for it, and for which such sacrifices are constantly being made, namely, love, and its sexual gratification. The suppression of sexual life by sexual ethics is a deplorable concomitant of culture. In the interest of the public the individual is forced to immolate a part of his personality, especially his sexual instincts, and, among these, more particularly the heterosexual desire.

Under favorable circumstances, which include elements ranging from a trained will-power to sedative surroundings, the sexual instinct may be sublimed, that

is, directed towards a spiritual instead of a carnal goal. It is then devoted to the amelioration, rather than the propagation of the species. Sublimation processes are the basis of artistic and scientific activities, and in more than a few cases, an unflagging diligence along a chosen line of work is the result of a transformed unsatisfied sexual desire. The sublimated sexuality finds its highest expression in adaption to circumstances, the harnessing of the plunging horses of instinct to the chariot of reason. But it is only the direction of the desires that is changed, not their strength; and unless a certain measure of direct sexual activation be left, the sublimation will lead to disease.

Psychoneuroses are the price of sublimation, the negative of the perversions, according to the teachings of Freud. The self-indulgent, who compromise between desires and gratification, are often blessed with iron "nerves," whereas the would-be ethereal and sexless are proverbially high-strung and nervous. The hysteric, beyond the boundary line of psychic equilibrium, cling so tenaciously to the desire as to renounce peace and happiness, preferring silence to confession. They exhibit an exaggerated tendency to sublimation, but their symptoms are abnormal sex manifestations.

Other psychoneurotic states, which, in the opinion of Freud, are mainly due to sexual abstinence, or rather, suppression, with or without masturbation, are the phobias and obsessions. The pathologic condition is, again, the outcome of the disproportion between the sexual demands and the sexual suppression.

A sexual etiology is common to all neuroses, and, in the psychoneuroses proper, dates back to childhood (Freud's infantile sexual traumatism). Such psychoneurotic states, on the basis of psychic traumatism, besides the phobias and obsessions, include neurasthenic fears with their sequelæ, disturbances of sleep, such as nightmare, and of speech such as stammering; nervous

affections of the heart, the sexual heart, phrenocardia; hypochondriacal conditions; a number of sexual perversions, fetichism, sadism, masochism, psychic impotence, homosexualism and vaginismus. In his modified views, Freud holds that the factors of constitution and heredity regain their supremacy in proportion as the accidental experiences of sexual adventure recede into the background. Nevertheless, the customary term "neuropathic disposition," according to him, really means "sexual constitution" of the individual. The undeniable fact that sexual traumatism also plays a part in the life history of individuals who are apparently free from neurotic taint is ingeniously explained as the correct balance of the sexual equation.

In his later teachings Freud admits that the accidental effect of a psycho-traumatic experience on the infantile sexuality is not so far-reaching or relevant in its bearing on the origin of a psychoneurosis as is the individual reaction of the sexual constitution. His original view that a morbid fear is a sexual desire diverted from its natural course has been extended by the acceptance of other possible causative factors, namely a congenital diathesis expressed by psychic inadequacy for the control of the somatic sexual tension. The onset of a neurosis is governed by the original resistance of the nervous system, and facilitated by the ordinary emotional shocks of the individual's life, such as fright, grief, psychic fatigue; but the specific cause, the factor which determines the form of the neurosis, is sexual in character.

Hysteria, according to Freud's interpretation, is the result of the conflict between the sexual desire and the sexual suppression. The hysterical symptoms have the value of compromises between these two psychic currents. The sexual desire is confronted with internal resistance, notably modesty and physical aversion. Sexual abstainers (teetotalers in the *ars amandi*) accumulate

a mass of unassimilated memories, suppressed reminiscenses and converted emotions. In the course of time, the original feelings are blurred, and finally vanish from the realm of consciousness, to become replaced by the familiar hysterical symptoms of globus, palsies, fits, etc. Provided the source of the disturbance can be reached, the suppressed emotion will find its natural solution, and the symptoms will disappear. Having a sexual etiology, hysteria is never associated with so-called innocence of thought, and hence the danger of corruption does not exist. Being of psychogenic origin, the disease requires fundamentally psychic measures for its control. The symptoms must be literally reasoned away.

I trust that I have said enough to convince everyone that the relationship between neurology and preventive medicine is a close one, and that the neurologist of the future must be one who works diligently in the field of preventive medicine. I venture to express the opinion that the expert in preventive medicine would profit from some training in neurology.

But the subject that I venture to bring to attention in the second part of my address, namely that of the psychoneuroses, is one that must be dealt with entirely from the pedagogic standpoint. We, as physicians, however, must devise ways and means for giving such instruction. It certainly cannot be given, and should not be given by the teachers in our schools. I regret to say that the vast majority of them that I have encountered have an ignorance of the principles of sex knowledge and sex hygiene that is almost abysmal. In fact, I am not at all sure that we physicians, as a class, take the trouble to acquaint ourselves as intimately with the principles of sex physiology as we should, and, of course, we cannot expect to teach that which we do not know, and we should not permit ourselves to get a knowledge of it while teaching, because the experiment is too dan-

gerous to those with whom we are dealing. It seems to me that plain wholesome lectures on sex physiology given to small classes and in many instances individually, should be a part of the curriculum of every public and private school, and that these lectures should be given by physicians, men and women, whose sanity, honesty, earnestness, and ability have been testified to or vouched for by their appointments from the executive medical officer of boards of health.

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THE RÔLE OF PEDIATRICS IN PREVENTIVE MEDICINE

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Since my paper deals with no narrow specialty, but one which involves the application to youthful subjects of all the rapidly growing wealth of medical knowledge, I am aware that it will be a difficult matter to present the rôle of pediatrics in preventive medicine without trenching somewhat on the field of other speakers. As a specialty, it can scarcely be said to have been recognized in this country before the creation of a separate department for our distinguished colleague, Dr. Jacobi, at the College of Physicians and Surgeons of New York, in the year 1860. Before that time, and too largely thereafter, it was linked to obstetrics and diseases of women, with which subjects it had only a quasi connection, and in consequence its study was contracted and neglected. Having broken its bonds, however, and emerged from overshadowing obscurity, pediatrics to-day stands for the application of the same scientific methods of investigation to the immature organism of the child and the diseases to which it is liable, as are applied to the study of similar processes during mature adult life and the subsequent period of gradual senescent decay.

Nevertheless, although often referred to and practiced as a specialty, pediatrics belongs, not to the few, but essentially to all practitioners of medicine, for they, rather than the specialist, are called on to apply its teachings in family practice to the vast majority of infants and children.

To distort somewhat a well-known saying of Dr. Oliver Wendell Holmes, let me advance the view that preventive medicine, as applied to the child, should begin with the grandparents. Since, however, this carries me somewhat beyond the limits of the subject assigned to me, I must perforce begin with the birth of the child. Even at this starting point, the pediatrist finds himself disputing the territory at both ends of the social scale—at one end with the midwife, and at the other with the obstetrician. Great as is the disparity between both the knowledge and equipment of these two groups who assist in ushering infancy into this inhospitable world, suffice it to say that there is a growing feeling that greater effort should be made by both groups to secure maternal nursing, because their tenure of the field is sufficiently long to determine, often irreparably, the mode of the infant's nourishment. If breast feeding has been unnecessarily rejected, the pediatrist, when called in, must make the best of the situation as he finds it, but he cannot always retrieve the error. However, since in the majority of cases the family physician conducts the confinement and also subsequently cares for the child, we may assume that pediatric teaching governs the management of the infant from birth.

First and foremost, pediatrics deals with the nutrition of the infant, for unless it lives, science can do nothing further for its welfare. Aside from reasonable hygiene which so many healthy infants seem surprisingly able to do without, the first step in the preservation of life is suitable food. As the majority fed at the breast thrive and the more vulnerable among the infants were found among those artificially fed, early attention was inevitably centered on substitute feeding. Since cows' milk was the best available substitute for breast milk, every effort was made to render it more suitable.

The discovery of teeming myriads of bacteria in commercial milk led Soxhlet to propose sterilization, in the belief that to bacteria were due the noxious effects of

cows' milk on the digestive tract of the infant. Pasteurization followed as an improved method of killing, but not necessarily rendering innocuous, the masses of bacteria with their toxins which abound in ordinary milk. Then followed the triumph of pediatric endeavor in the inauguration of the movement, destined to be world-wide, for the production of clean milk, the laurels of which we willingly share with other workers who have helped to make it a possibility. This work must suffer no abatement. Milk, fresh and uncontaminated, must be produced in increasing quantities for the use of all young children, yet even recently there have appeared those who, tinctured with commercialism and ignoring all other factors, have claimed for Pasteurization all that has been accomplished in the reduction of infant mortality. From the pediatric standpoint, the rôle of Pasteurization is and ever should be, to keep clean milk sweet until it is consumed, never merely to render a filthy milk somewhat less dangerous.

During the past decade, pediatric investigators have been restlessly and energetically active in perfecting infant feeding. The belief once cherished that an exact counterpart of human milk might be made from cows' milk was quickly shattered. Although normal infants throve in greater numbers on such mixtures, it was found that they must be adapted to the inexperience, the age, and the idiosyncracies of the individual infant. For such adaptations, rules of great value were formulated and proved, yet for the less normal digestions further studies seemed necessary. As a result, the theoretical structure on which infant feeding was first based has been torn down and rebuilt. The proteins, fats, and latterly the sugars and carbohydrates entering into the composition of bottle feedings, have been scrutinized, tested, and adjusted. As a consequence, it may now be confidently stated that the infant, fed intelligently according to modern American methods, has to-day a better chance both of life and well-rounded development than ever before in our history.

As has been indicated, the purpose of nutrition is not only to preserve life, but to produce an uninterrupted and well-balanced development of the body. Gain in weight alone is not all that is required. Nature, as a rule, strives to do her work well, and if the conditions are favorable slights no part of it. But no workman can build well unless liberally supplied with proper material. The infant fed on condensed milk, for example, may be fat and apparently healthy, but Nature has been forced to do scamped work. In the usual dilutions, condensed milk is low in protein, lower in fat, and overrich in sugar. Such one-sided nutrition produces a development poorly fitted to withstand the effects of illness. Let it not be understood that this form of feeding is chiefly culpable. All artificial feeding holds this danger, partly because of its composition, partly because of the limitations of different infants in the digestion and absorption of individual elements in any food which replaces the natural breast milk. Such malnutrition, in greater or lesser degree, accompanies the ignorant home feeding, the carefully or carelessly yet faultily composed formulæ of many medical men, and the "just as good" substitutes of the patent-food makers. It is sometimes a question in my mind whether those errors of nutrition which are of lesser degree do not in their total produce more harm, since they are more frequent, less commonly detected, yet equally liable to leave their marks in some degree on their victims.

On the other hand, a body developed through proper, well-balanced nutrition, is not only less susceptible to diseases caused by bacterial invasion, but, if such occur, is better able to throw them off, and less liable to complications. When we realize the part played, not only by complications but by the other direct and indirect results of malnutrition in swelling the mortality figures among young children, the prophylactic importance of proper nutrition, in producing increased resistance becomes evident. Since we must all realize that the sturdy

child possesses greater powers of protection and recuperation, it would hardly seem necessary to defend this premise; nevertheless innumerable instances of the effects of malnutrition present themselves to our minds.

With the marasmic infants digestive action is crippled; assimilation below par; slight errors in diet cause further disturbance; pulmonary diseases are readily acquired; hypostatic pneumonia is almost a specialty; furunculosis of a severe and debilitating type is not uncommon; suppurative conditions show little or no tendency to repair; the middle ear becomes affected on slight provocation; in the hot months, summer diarrheas more than decimate their ranks.

Rachitis, another form of malnutrition, varies so widely in the degree and distribution of its manifestations, that the claim so often made that it is present in the large majority of bottle-fed infants seems to be substantiated when careful search is made. The classical bone changes, important as they are, do not manifest the sole incidence of this common affection. The ligaments, the muscles, the nervous system, the respiratory tract and the intestine may likewise be affected and contribute to the symptomatology. Aside from such bone deformities as may influence the patient's appearance and bearing in later life, those of the thorax and pelvis are the most serious—the former increasing both the liability to and the danger from pulmonary disease; the latter, in the female, menacing in later years the life of both mother and child during parturition. The undeveloped musculature of the rachitic child, causing him to creep long after he should have walked, keeps him longer exposed to the dust and draughts of the floor, and deprives him of normal exercise, which plays such an important part in healthy development. The underfed and unstable nervous system contributes through convulsions and laryngismus its own quota of danger, not only of death, but also of lasting paralysis if there be hemorrhage at the time of the seizures. The

relaxed and disturbed intestinal tract of the rachitic furnishes frequently a favorable field for the development of serious enteric affections.

The third of this group, infantile scurvy, is happily so uncommon as to play a smaller part in infant morbidity and mortality than the other forms of malnutrition, but its comparative rarity increases the danger that it may not be recognized and receive appropriate treatment. No affection of infancy can, however, be traced with greater certainty to some deficiency in the elements of nutrition, and its increasing frequency from the too exclusive and prolonged use of proprietary foods warns us to be alert in its detection.

The pediatrist has a further important rôle, as the adviser of the mother in the care of her children. All that may be summed up under the comprehensive term hygiene is taught her either in answer to her questions or through the medium of the printed page. The influence of bathing, clothing, fresh air, exercise, and hours of sleep, in the building of a resistant body and in the prevention of disease, together with the necessity for their nice adaptation to the differing periods of infancy and childhood, need only to be mentioned to this audience to be appreciated.

It is also the privilege of the children's physician not only to treat disease, but to foresee and prevent it. Simple as seems this statement, an incalculable amount of benefit can be bestowed on humanity in this way. Aside from the countless ills which can be prevented by proper management of the feeding, anemia must be recognized and treated if the child is to escape the severer effects of the acute infectious diseases. Rachitis, already mentioned, which the parent invariably overlooks until its effects are marked and possibly irremediable, must be detected and checked. The prophylactic care of the teeth, so commonly neglected because of the division of responsibility with the dental surgeon, should be insisted on from their earliest eruption. Adenoids

and hypertrophied tonsils, which are rarely brought to the attention of the throat specialist until they have already wrought injury to the child in one or more directions, should be recognized and removed. The popular view, so often advanced, that adenoids and tonsils will be outgrown, or that it is scarcely worth while to remove them since they may later recur, is, without question, the echo of evasive statements made by physicians, who, feeling themselves incompetent to perform these simple operations, were the more willing to defer them indefinitely.

In direct opposition to the views of certain rhinologic colleagues, I believe that the early removal of adenoid obstruction to nasal breathing favors the normal use and consequent expansion of the nasal passages, and lessens very materially the probability of the occurrence of those chronic hypertrophic obstructions within the nose which later make the removal of the adenoids ineffective in restoring nasal breathing. He believes that the view of the rhinologists, that conditions other than the adenoid are responsible for a large proportion of the mouth-breathers, is due to the late age at which they see these patients, and that the opportunity to operate more frequently during the first and second years would soon cause a modification of their views.

Nor does our interest and supervision cease when the child passes from the home to the school, or, in the case of the less fortunate, to the workshop or the factory. Behind the educator, the inspector and the reformer, stands the pediatrist, who, from his more intimate knowledge of the child's development and limitations, directs their enlightened efforts for the betterment of conditions in these fields.

I have endeavored to outline briefly in the foregoing remarks the lamentable results of neglect, and the enormous opportunities of the pediatrist if he exerts a wise control over the growing organism of the child. The

trite phrase that "as the twig is bent, the tree's inclined," had never truer application than to the youthful body. Pediatrics has reduced to a science this formative period of human life. Endless possibilities pertain to the conscientious application of our knowledge.

Extensive as is the debt which we owe to the laboratory and to the co-operation of other specialties, gratefully as we acknowledge their aid in combating disease and in insuring to the rising generation a better equipment for their struggle, nevertheless, the earliest and the ultimate responsibility falls on the children's physician, for to his hands they are confided by their parents, and on his judgment reliance is placed, not only to deal with the present, but to detect and remedy conditions and tendencies ere they assume a harmful or serious phase.

807 Madison Avenue.

THE CAMPAIGN AGAINST DIPHTHERIA AND SCARLET FEVER IN CHICAGO

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These two diseases are constantly endemic in Chicago, each day bringing its quota of reports to the health department. In diphtheria and scarlet fever, perhaps to greater extent than in any of the other more serious endemic diseases which are prone to become epidemic, large cities, as a rule, demand an adequately manned contagious disease bureau and expect great vigilance and diligence of those in charge in their efforts at preventing epidemics.

Chicago until recently was wofully deficient in her safeguards against epidemics of these two diseases. In spite of repeated warnings she chose to ignore the recommendations for adequate protection and was content with the following conditions as regards diphtheria and scarlet fever.

For several years prior to 1907 the function of the health department in these two diseases had been little more than advisory to the attending physician, who practically had delegated to him the protection of the public against the spread of contagion. The physician made the diagnosis, gave the family such instructions as he chose regarding quarantine, reported the case if he chose to comply with the city ordinance, and, if he reported it, used his own pleasure about having the premises placarded, and the time of ending the case.

Because the activities and energies of the few medical inspectors were needed in fighting smallpox or in other equally urgent duties, such as antitoxin administration and intubation, the contagious disease bureau was forced to admit its inability to compel the reporting of diphtheria and scarlet fever cases, and therefore extended to the attending physician, as the price of reporting the case and cooperating with the department, the privilege of "assuming responsibility" for the prevention of the spread of contagion. By simply writing the magic word "assume" in a certain space on the reporting postal card the physician enabled his patient to escape practically all surveillance of the bureau of contagious diseases, and no warning placard was posted.

This plan of allowing the attending physician to "assume responsibility" may have resulted in an increased number of cases being reported at its inception, but in 1904, when I first became intimately acquainted with its results, I was speedily convinced that it was unpractical and not justified by existing conditions, when all other large cities of the United States, and even the majority of progressive villages in the vicinity of Chicago, were requiring the reporting of cases by physicians and the posting of warning placards.

Under this plan of "assuming responsibility" many physicians took the stand that, inasmuch as the management of diphtheria and scarlet fever cases was left to them anyway, and their course of action was the same, whether the case was reported and responsibility assumed, or the case was not reported at all, there was no reason that they should bother with reporting the case. Other physicians took the position that it was absurd for a health department to think that a physician who sees a case of contagious disease for fifteen or twenty minutes once or twice daily at the onset, and perhaps once a week during the convalescent stage, could guarantee that his instructions as to quarantine would be carried out. The physicians of this

group would not put their signature to something they could not guarantee and still were not willing to placard the premises of their patients unless it was a general requirement. Another smaller group of our physicians reported their contagious cases and had premises placarded because they felt it a duty they owed the community in which they practiced that they should have knowledge of the location of all diphtheria and scarlet fever in their midst.

Under this system the laity soon came to feel that placarding was a reflection on their good citizenship, as indicating they could not be trusted to do the right thing without a warning sign on their door, while their next-door neighbor, perhaps much more reckless of life and the rights of others, had no warning sign. This feeling led them to beg their physicians not to have a placard posted, and, ultimately, to seek out that physician in the neighborhood who never had warning signs placed on the premises of his contagious cases. This sentiment among the laity helped the majority of physicians who never reported their cases, and also that large group of physicians who "assumed responsibility," whereas the small group of physicians who were doing the right thing as measured by standards set by all progressive municipal health boards found their practice curtailed with resulting financial loss. The plan of "assuming responsibility" was, in my opinion, the greatest millstone to progress that could be tied about the neck of any municipal contagious disease bureau.

By Jan. 1, 1907, the situation as regards scarlet fever was alarming and as regards diphtheria threatening. During the preceding year just closed diphtheria reports had almost doubled and more than four times as many cases of scarlet fever had been reported by about the same group of physicians who had done the reporting in previous years. This probably meant a marked increase in the number of these two diseases and that less than one-half the cases were reported, and yet delegations to

the bureau of contagious diseases were frequent and insistent that something be done to protect their communities where localized epidemics existed. Many of the medical profession were in a measure hostile, as they had come to feel it their prerogative to have charge of quarantine and other restrictive measures. The laity, too, resisted placarding of their premises.

The bureau of contagious diseases, forced to a "do-nothing policy" for want of men, was already greatly overworked. Records were in a chaotic condition. The office force was absolutely inadequate to handle a normal situation. Unavailing had been all efforts to convince those in authority that, in many respects, a contagious disease bureau is an emergency service just as truly as is the fire department, and that to cope with contagious diseases it is just as important that a large city have a specially trained and adequate contagious disease bureau force, if lives are to be saved and financial loss averted, as it is that she maintain a well-equipped and well-manned fire department for protection of lives and property.

Early in January, 1907, the threatening epidemic of scarlet fever broke forth and on January 29 reached its height as regards the highest number of cases reported in one day, with 413 reports. Our common council finally took the situation in their own hands and speedily provided for 350 men, nearly all physicians, 100 more than the number asked for by the contagious bureau, with whom to combat the epidemic. This was largely a milk epidemic.

It was February 1 by the time these raw recruits were instructed and competent to do work that would bring results. The cases decreased almost one-half in February over January. March saw a decrease of about one-half as compared with February. By April the situation was well in hand.

During the excitement incidental to the epidemic a level-headed councilman, stimulated doubtless by some

progressive physician who realized the evils and handicap of "assuming responsibility," had passed an ordinance making it compulsory and mandatory on the health department to placard all cases of scarlet fever and diphtheria. With the lessons of an epidemic fresh in memory, and with the aroused public sentiment and a united press demanding safeguards against future epidemics, the prospects for better regulations as regards scarlet fever and diphtheria were bright indeed.

THE PROBLEMS FOR SOLUTION

Some of the problems left for solution by the 1907 epidemic were the following:

PROBLEM 1.—How to keep alive the aroused public sentiment to the point where press and public would demand a properly organized and manned contagious disease bureau that should pursue as progressive, as wide-awake and as aggressive an attitude towards scarlet fever and diphtheria as it did towards smallpox. This first problem was, fortunately, completely solved when in April, 1907, Chicago was given a progressive, fearless, energetic and thoroughly competent Commissioner of Health, respected by the medical profession of Chicago, her press and public generally. The press and public, guided largely by Dr. W. A. Evans, the Commissioner of Health, has certainly demanded a live, vigorous policy of the Contagious Disease Bureau ever since.

PROBLEM 2.—What immediate safeguards were needed for prevention of future epidemics? The following had been advocated for years by Dr. Spalding, the chief of Bureau of Contagious Diseases, and seemed desirable:

A. Increased number of medical inspectors.

B. A systematic, unified field inspection service.

C. Reorganized methods of keeping contagious disease records.

D. School inspection for contagious diseases.

E. An increased office force, work better systematized, and a full day's work demanded.

F. More accurate office data as to location of cases.

A. *Increased Number of Inspectors.*—One hundred medical inspectors were asked for and secured within one month, and they have ever since been a permanent part of our force.

B. *A Systematic Field Inspection Service.*—This was obtained by dividing Chicago's 190 square miles into 100 districts

and assigning a medical inspector to each district. He is made responsible for the contagion and other conditions in his district. A definite territory to each inspector makes much less duplication of work. This field work is fourfold: (1) inspection; (2) investigation; (3) vaccinations, and (4) diagnosis.

1. By inspection we mean the proper handling of a case of contagious disease regularly reported by the attending physician. An inspection implies:

(*a*) If diphtheria, a diagnostic culture, also antitoxin for patient and contacts.

(*b*) Placarding premises in front and rear.

(*c*) Establishing a strict quarantine.

(*d*) Definite oral and printed instructions to family as to quarantine requirements.

(*e*) If good quarantine is impossible, leaving a note for ambulance driver and order to hospital.

(*f*) If diphtheria, and case is to go to hospital, culture contacts.

(*g*) Leaving card of instructions for quarantine officer back of front door placard, giving him definite, concise information as to the quarantine requirements laid down by the medical inspector.

(*h*) Notification to principals of schools attended by children in building of case of contagious disease and also to principals as to who, if any, from building infected, may safely attend school.

(*i*) A complete written report to the department of each case inspected, embodying a statement of above and other facts, such as name of milkman, source of infection, school and room attended, etc.

In 1909, 49,952 inspections were made by medical inspectors. During the first five months in 1910, there were 27,693 inspections.

2. Vaccinations, in case of smallpox exposures and contacts, includes following up cases to see if vaccinations are successful and a watch for symptoms of smallpox. If symptoms develop, then prompt removal to Isolation Hospital.

3. Investigations are made of suspected cases learned of from all sources other than through the attending physician. Inspector is required to examine case carefully and if contagious, report to the department, quarantine, placard, etc.

In 1909, there were 23,141 investigations by medical inspectors. In 1910 to June 1, there were 2,216 investigations by medical inspectors.

C. *Reorganized Methods of Keeping Contagious Disease Records and Files.*—Instead of using the card-index method with a

separate file of each item relating to a case, which required us to look in five or six different places before we could get complete data on the case, it was decided to use the envelope-filing method. This enables us to keep all data relating to case where we can refer to it quickly in its entirety. This change was of great value to both office force and public as to economy of time and convenience.

D. *School Inspection for Contagious Diseases.*—This is probably the most valuable single factor that Chicago has in the prevention of spread of contagion through the pupils of her 400 schools. This plan calls for a daily systematic inspection as follows: (1) A superficial routine examination of all pupils at opening of schools in fall; (2) all pupils who have been absent for more than three days before entering the class-room; and (3) any child referred to inspector by principal or teacher as suspicious.

How valuable this is in preventing diphtheria and scarlet fever is self-evident when it is explained that out of 537,599 pupils examined in 1907, 633 cases of diphtheria and contacts, many of whom were undoubtedly "carriers," were halted at the threshold of our schools. In scarlet fever the figures are even more convincing; 1,456 cases of scarlet fever and contacts were excluded from our schools.

A summary since 1907 follows:

SCHOOL MEDICAL INSPECTION FOR CONTAGIOUS DISEASES

		Excluded			
Examined.		Diphtheria.	Contacts.	Scarlet Fever.	Contacts.
1908	499,046	178	180	278	254
1909	647,842	47	292	189	581
1910, to June 1.....	262,645	14	136	92	233

E. *Increased Office Force.*—The office force was more than doubled, the work was carefully systematized and a full day's work demanded.

F. *More Accurate Office Data.*—Daily spot maps, made by months, were installed so that those in charge of contagious diseases might see at a glance the location and grouping of the cases of diphtheria and scarlet fever.

PROBLEM 3.—What measures were needed as additional safeguards against future epidemics? The following, among others, seemed very desirable and plans were laid to secure and put them into operation at no very distant date:

A. *Placarding and Instituting all Quarantine Measures More Promptly.*—To accomplish this, we go for our mail before 7 a. m., and have three clerks come one hour earlier than for-

merly. We sort, assign and telephone all assignments to the medical inspectors before 8:30 a. m., which is before they go out on their morning's duties. By this plan we often quarantine a case twenty-four hours earlier than formerly. We go for our mail Sundays and holidays and at once telephone out to the inspectors all diphtheria and scarlet fever cases for immediate action. This frequently means a saving of forty hours in instituting quarantine.

B. *More Strict Quarantine in Diphtheria and Scarlet Fever.* —To meet this requirement it was decided to separate the workers of the family from the patient and his attendants more completely. The plan adopted was that all adults of family who work out must live in a portion of the flat completely cut off from the patient and attendant, or if in a large house, live in a portion remote from patient and not come in contact with anyone who comes in contact with patient, or if these conditions were impossible of fulfilment, then the workers would have to room and board elsewhere or quit work and stay at home, unless they should elect to end the entire quarantine by sending the patient to hospital.

This plan works a hardship to a certain extent, but not as great as one would suppose. Very frequently the living-rooms are so arranged that by sealing one door the patient and attendant can be completely isolated from front part of flat and placards placed only on back door, so that the workers may sleep in front, but must take meals and find toilet facilities outside of premises. Our rule requires that the patient and attendant be given that portion of the house containing bath or at least toilet facilities.

To control the quarantine more effectually, a plan of espionage was devised. The disinfector is to call every other day and watch for violations of quarantine. On his first visit he removes from behind the front-door placard a card left by medical inspector for him, giving concise instructions as to what quarantine shall be demanded. On back of this card he notes the date and quarantine conditions found at each subsequent visit as well as mailing the department a separate report at each visit.

The quarantine officer is supplied with special blanks to be filled out carefully and completely in case he finds flagrant violation of quarantine, and this data is used as evidence in prosecutions. If his quarantine report is unfavorable, we determine from the statement what action is needed. As a rule, if the case is one of diphtheria with a positive diagnostic cul-

ture, we immediately send the patient to a hospital. If the case is one of scarlet fever, we also do this, if we can obtain room at Cook County Contagious Hospital. This hospital very frequently is crowded to its capacity, so we must have, then, a special police officer stationed to enforce a rigid quarantine. We have been censured for maintaining such rigid quarantine requirements, but, personally, I prefer to be blamed for some slight financial hardship to one family for the sake of adequate protection of many families rather than the reverse, which was formerly often true, namely, that mothers would call, dressed in mourning, and blame us because their children had contracted diphtheria or scarlet fever and died through the carelessness of some person, made possible through failure of the department to provide the needed protection.

C. *A Corps of Medical School Nurses.*—Nurses are an indispensable adjunct to any efficient school medical inspection service, and the forty nurses whom we have, have added fully 50 per cent to the value of our school inspection service. These nurses were obtained and put to work Oct. 12, 1908.

D. *Scientific Handling of Diphtheria.*—Dealing as we were with a disease of definite etiology, with a specific therapeutic agent, if used early, and also amenable to transitory prophylactic immunity, our Commissioner of Health early decided that we ought to use accurate laboratory information as our basis for terminating diphtheria quarantine, instead of guesswork. Inasmuch as contacts are at times "carriers" and the cause of epidemics, it was necessary that our bureau should take cognizance of them. It was finally determined to require two negative cultures on consecutive days from patient and one from each contacts before raising the quarantine through disinfection.

It was also decided that we should get contacts immunized by acting through the attending physician if possible, but if he was indifferent, then through the medical inspector. These two measures have now long been in operation. Only since January 1 have we gone a step further and insisted on a diagnostic culture supplementing the clinical diagnosis. In all cases of diphtheria in which the attending physician has not taken a culture, the medical inspector is instructed to do so. If the first diagnostic culture is negative, he takes a second one, as statistics show that from 12 to 18 per cent of throats, when a negative result is obtained at the first attempt, will give a positive result when a second culture is taken. With two negative cultures from the throat and a written state-

ment from our medical inspector that in his opinion the case clinically was not diphtheria, we send the attending physician the following communication:

Two cultures have been examined with negative results in the case of diphtheria reported from .....St., in person of ..... On the enclosed card, please advise us of your wishes as to the disposal of case. Should quarantine be continued or terminated now? It terminated now, is disinfection desired?

The physician replies on a card of the following form:

Concerning case reported as diphtheria in the person of..... ....., living at....., I hereby advise that

Quarantine be { Terminated. / Continued. } And that disinfection be { Performed. / Omitted. }

Name....., M.D.,

Address.....

E. *Establishment of a Municipal Hospital.*—Facilities for hospitalization of diphtheria cases had long been needed, and it was decided finally that, inasmuch as we seldom had many cases of smallpox, it would be advisable to build a less expensive plant for smallpox, and take over that commodious and splendidly equipped hospital for diphtheria cases. The diphtheria hospital was opened Nov. 27, 1908. A more rapid mode of conveyance of patients to the hospital seemed a necessity, and to obtain this, an automobile ambulance for contagious diseases was procured.

F. *Better Communication Between the Municipal Laboratory and Physicians.*—To accommodate our physicians better and make the Municipal Laboratory more valuable to them, a plan for keeping culture media at all police stations was worked out, and incubators installed at eight police stations in various portions of the city. A messenger service, twice daily from the police stations to the department of health, was also instituted. The attending physician or medical inspector could hand the inoculated culture outfit to the first policeman he met. He in turn would take it to his station; the desk sergeant upon receipt of it would arrange to send it by messenger to the department of health, or else to the nearest station with an incubator. As a rule, it would not be in the police station incubator long before the time would arrive to send a messenger to the office of the chief of police and incidentally he brought along these cultures to the health department. It was also arranged to open the municipal laboratory earlier each morning and continue it later each day, with better service also Sundays and holidays. These improved conditions

together with numerous free antitoxin stations, distributed over the city, made it easy for physicians to apply laboratory methods in diagnosing diphtheria and gave them no excuse for failure to use antitoxin.

G. *Means of Making Our Health Ordinance More Effective.*—This problem was solved by having passed by the city council certain rules and regulations to supplement the existing health ordinances, which, when passed, would have the weight of ordinances. These "rules and regulations" were passed Jan. 27, 1908, and have been of enormous value to us in enforcing health measures. Of these ninety "rules and regulations" at least twenty-eight apply directly to diphtheria and scarlet fever, and nineteen others indirectly touched on these two diseases.

H. *Compulsory Reporting of Sales of Antitoxin by Druggists.*—Recently we secured a law, long wanted, which compelled a druggist to report the sale of antitoxin. This reads in substance as follows:

An ordinance passed by the city council Nov. 1, 1909, requires all persons, firms and corporations to report to the Commissioner of Health within twenty-four hours any sale or gift of diphtheria antitoxin within the city of Chicago, giving the name and address of seller, buyer and patient; also the date and hour of sale and number of bottles sold, with number of units in each.

I. *Means of Getting Diphtheria and Scarlet Fever Cases Reported.*—From the time "assuming responsibility" was abolished, this problem was recognized as of great importance and plans were made to solve it. We were all agreed that physicians were not reporting their diphtheria and scarlet fever cases as generally as they should. Gradually, however, the physicians have taken to reporting their contagious cases, until to-day this problem is less complex and of less moment than formerly. A large majority of our physicians are pleased with the present methods of the department in the management of these two diseases. The very small minority who do not willingly report their cases of diphtheria and scarlet fever, do, nevertheless, report them because they realize that if they are detected concealing or "not reporting" a case of diphtheria or scarlet fever they are put to the inconvenience and expense of defending themselves in court for violating an ordinance, with danger also of having to pay a $10 to $200 fine. If a suit is started where there has been flagrant, almost criminal, negligence on the part of the physician it is given publicity in the newspapers. Also, if a conviction is secured, additional publicity is given.

As a rule it works this way: Suit is started, if a flagrant case, and the physician notified. He comes in alone, or with his attorney, to try to get the suit withdrawn. This is refused, but, on his promise to be good in the future, he is let off with costs and no notoriety in the public press. Less flagrant violations result in a letter to the physician asking him to call at the department and state his case, provided he thinks there are any extenuating circumstances which might cause the department to refrain from pressing the contemplated suit against him. Even this makes him trouble and elicits a promise to be good in the future. In still less flagrant violations, the department sends a form letter calling on the attending physician to make a statement in writing as to his relations with a case of diphtheria or scarlet fever said to have been "not reported" to the department.

This small percentage of physicians know that the Health Department is in earnest about demanding that they report their cases of diphtheria and scarlet fever. They fully realize that we have the public, press, charity and other organizations demanding reporting of these cases; also, 300 school principals, a small army of school and Sunday school teachers, a host of school pupils and the police department, in addition to the regular machinery of the department, chiefly the school nurses and medical inspectors, all on the lookout for and ready to report hidden cases or suspected hidden cases to the Health Department.

This changed attitude of our people in three years is astounding and it is remarkable how often we hear from some one of these sources of the existence of a case of contagion before the attending physician's report gets to the department. Many physicians, slow in reporting cases in spite of the law requiring a report within twenty-four hours, are improving in this respect for the very reason that they fear that we will get the report from outside sources first, which will put them in the attitude of trying to conceal the case.

Another factor that makes for reporting of cases by the attending physician since school inspection was established, is the difficulty in concealing a case if there are school children in the family, as these children often tell of sickness at home and this leads to an investigation of the nature of the sickness by the school inspector.

If the patient is a school child, detection is still more certain when the medical inspector looks up absentees reported by school teacher as sick at home with sore throat or rash. Even if the case is not investigated, and after recovery the child

tries to reenter school, the medical inspector then reviews the nature of the illness and if there are suspicious circumstances about the case, he sends the child home and goes to the home and makes a thorough investigation.

If facts warrant it, the child is told to bring a written statement from the medical attendant that illness was not of a contagious nature. More than once we have confronted a physician with his written statement that there was no contagious disease present, when he had used antitoxin, and the culture from a reddened throat showed the presence of the Klebs-Loeffler bacilli. A grilling for a physician under these circumstances, together with inconvenience caused him and his patient, makes him a convert ever afterwards to that group who report their contagious cases. Many physicians formerly crawled behind the excuse that it was only a suspicious case, that no positive diagnosis was made and, therefore, not reported. To prevent the obvious abuse of this plea, Rule 4 was added to our rules; this reads: "It shall be the duty of the physician who suspects one of the above named diseases, to report it as a suspicious case. Such cases will not be placarded or removed unless a warranting diagnosis is established. A corrected report of the case shall be made by the attending physician as soon as the diagnosis is made."

Another factor in inducing the physician to report is that the department learns of the name and address of the patient and the attending physician in every case in which the state of Illinois furnishes free antitoxin within the city limits of Chicago; also the law that if the physician or family buys antitoxin, the druggist is compelled under penalty to report at once to the Health Department such sale, giving names and addresses of patient and the attending physician.

All reports from state and druggists are looked up in our files and if the case is not regularly reported by the attending physician, an investigation by the medical inspector is made. Our index envelope records of physicians who do not report or coöperate fully with the department is often of value. If a physician gets into trouble with the department over not reporting a case, he invariably makes the plea that it is his first offence, and that, heretofore, he has always coöperated with the department to the fullest extent. Often we can meet this plea with documentary evidence of from two to ten instances in which he has not complied with the law as regards the minor contagious diseases. We estimate that we are now getting reported about 95 per cent. of all cases of diphtheria and about 93 per cent. of all scarlet fever attended by physicians.

METHOD FOR HANDLING LOCAL EPIDEMICS

DIPHTHERIA

The following is a good illustration of procedure in diphtheria:

A public school known as the McCosh Branch, consisting of four large school-rooms and one small class-room, had been remarkably free of all contagion from the time school opened, early in September, 1909, and in this district no case of diphtheria had occurred in any family whose children attended this school.

On Nov. 1, 1909, three cases of diphtheria suddenly appeared in this district. On November 2 two more were reported and on November 3 three more cases. November 4, 5 and 6 each brought three cases reported among pupils of this branch. The evening of November 3 I communicated with Dr. G. M. Cushing, our medical inspector for that district, and instructed him to watch this situation, even if he had to neglect other schools. He stated that two factors were common in these cases. The patients all had the same milk-supply and all attended the McCosh Branch school. On November 4 a double investigation of the milk-supply by the medical inspector and food bureau excluded that as a cause. Dr. Cushing then took cultures from the throats of all the children in the school. November 4, 112 cultures from pupils of the three large rooms were sent to the municipal laboratory and on November 6 seventy-nine were sent in from the remaining pupils of this school.

The laboratory on November 5 reported that eight of the 112 cultures showed presence of Klebs-Loeffler bacilli. On November 6 the laboratory reported one positive result among the second lot of seventy-nine cultures submitted. All nine of the pupils with positive culture results were excluded from school, together with other children in these families. The entire school building was thoroughly disinfected. The school was not closed, although two or three delegations of excited

parents demanded it. It is the policy of the bureau not to close schools; we believe in getting the pupils with contagious diseases out of school and then keeping the well children in school, where we can observe them daily.

Among the 112 which were examined and from which cultures were taken was one throat so suspicious that this child was sent home at once. The medical inspector followed soon after and found the following conditions, if my memory serves me right:

One child was dead with malignant diphtheria and two others gave unmistakable evidence of beginning diptheria. The dead child had been attended for a week by a physician who had failed to recognize the nature of the malady, had given no antitoxin, and had permitted four children of the family to attend school. Another physician, called in as the child was dying, recognized the probable nature of the disease, used antitoxin, and no more deaths resulted.

Out of seventy-nine throats which were examined and from which cultures were taken on the second day was one so suspicious that the medical inspector took the child in his automobile to its home, with the intention of advising the parents to call their physician. On arriving he found an older brother, recently employed as a delivery boy for a near-by grocery, who had been sick for a week complaining of his throat. Examination showed a well-marked case of diphtheria. A sister, thoroughly exposed, was visiting in a near-by suburb, and when the medical inspector went to the address given he found her with a slight sore throat and brought her home.

A physician was called, positive cultures obtained, and all received antitoxin. Three of the four patients recovered, but the older brother developed a typical diphtheric paralysis and died on November 21.

Investigation in the homes of the other pupils whose culture gave a positive result revealed diphtheria clinically in one of these pupils, and when cultures were taken

from the throats of the members of the family a positive result was obtained from the mother, with a history of a probable mild diphtheria recently. The family physician reported and quarantined this family on November 6.

A second family called in a physician and the case was reported and quarantined. The remaining five, when visited, gave no evidence of diphtheria and members of the family, when cultures were taken, gave no positive result. Each child with positive cultures but no symptoms was immunized and placed under quarantine until two negative cultures were obtained, when he was readmitted to school.

Absentees from school were visited and cultures were taken, but no cases were found. After excluding the above cases on strength of laboratory findings not another case developed from these foci of infection in that school or in the district after November 9, and that little epidemic was at an end as soon as these cases terminated. This case is selected because of the small size of the school and the fact that it illustrates the various remedies used in combating diphtheria epidemics.

I know of no better illustration of the great value of laboratory methods. The laboratory told us accurately and quickly that the nine pupils in that school were a menace to 190 others. This elicited my admiration almost as much as did a demonstration a few years ago by Dr. H. Spalding, who, by inspecting the vaccinal status, was able to say which six of 250 people, thoroughly exposed for several days to smallpox in an institution, would contract smallpox; the six he picked out, and no others, did develop this disease.

SCARLET FEVER

The following, in a small way, shows the method of combating scarlet fever:

A neighbor complained to me that a child was attending a public school from a home where he believed there was scarlet fever. Our spot map showed a great many

cases in this immediate neighborhood. The medical inspector of the district was asked to investigate the complaint, and found a child with scarlet fever in this home and no medical attendant. A child of the family in the "peeling" stage was found, not in the public school, as reported, but in a parochial school. A careful inquiry elicited the following: This child was sick at home for a week and then returned to school with a statement that he had been ill with a cold. The sister in charge, instead of having him examined by the school medical inspector, permitted him to enter the class-room without such precaution. The history was so typical of scarlet fever that no inspector could possibly have overlooked the diagnosis. Thirty-nine cases of scarlet fever occurred among the pupils of that school, due to failure of this school, in this instance at least, to live up to the requirements.

A plan of control given a trial in connection with the cases quarantined during this little epidemic worked so admirably that it was later attempted on a much larger scale. The plan was this: A disinfector was detailed to call daily on the thirty-nine patients under quarantine and make them all take precautions against spread of contagion. Incidentally he disinfected premises whenever one of these cases terminated. The following extract of a letter written by me Feb. 18, 1909, to the medical inspector of this district shows the success in limiting the contagion to the original cases infected:

On January 30 we put a disinfector in your district to watch the thirty-nine cases of scarlet fever and to maintain a strict quarantine. Since then no new cases have developed and all but twelve of the old cases have terminated. It is necessary to remove the disinfector to some other district. Please visit each of these remaining cases daily until terminated. See if you cannot prevent a new case occurring from any of these.

The following is another illustration of what can be done in efforts at prevention. A number of small children were exposed to scarlet fever in a nursery. These

children were all in their homes before exposure was known to the health department. The name and address of each was secured, the family advised of the exposure, and each was kept under close observation by the medical inspector of this district during the period of incubation. In this way any cases developing were promptly recognized and placed under early quarantine.

The figures given in the accompanying tables seem to indicate a marked increase in the number of cases of diphtheria and scarlet fever in Chicago in the last two years.

TABLE 1.—CASES OF SCARLET FEVER REPORTED TO THE CHICAGO DEPARTMENT OF HEALTH FROM JANUARY, 1904 TO MAY, 1910

	1904.	1905.	1906.	1907.	1908.	1909.	1910.
January	215	109	458	3058	473	881	688
February	197	103	383	1741	438	590	671
March	189	94	478	894	416	644	692
April	167	85	527	562	354	587	600
May	106	71	513	421	301	455	...
June	91	72	489	315	287	382	...
July	41	57	284	276	203	261	...
August	42	52	213	242	173	216	...
September	45	41	270	270	297	342	...
October	84	79	369	291	608	514	...
November	129	145	519	341	841	684	...
December	110	198	586	445	914	686	...
Total	1416	1106	5089	8856	5305	6242	2651
Deaths	143	79	493	715	398	360	131
Per cent	.101	.071	.097	.081	.075	.058	.049

TABLE 2.—CASES OF DIPHTHERIA REPORTED TO THE CHICAGO DEPARTMENT OF HEALTH FROM JANUARY, 1904 TO MAY, 1910

	1904.	1905.	1906.	1907.	1908.	1909.	1910.
January	313	262	475	923	417	745	468
February	245	217	339	690	401	522	443
March	172	189	348	491	379	522	470
April	143	193	273	355	233	483	527
May	123	140	301	293	254	378	...
June	152	144	272	259	306	320	...
July	127	152	229	186	255	268	...
August	130	110	181	212	251	223	...
September	150	249	286	337	341	327	...
October	290	438	530	521	788	550	...
November	376	461	613	563	880	719	...
December	384	346	610	508	934	601	...
Total	2607	2901	4457	5338	5439	5658	1908
Deaths	395	426	574	536	564	675	253
Per cent	.151	.147	.129	.100	.104	.119	.132

We believe, however, that there have been no more cases in Chicago for the past two years than in 1904 and 1905. We are convinced that the cases are reported much better than formerly and that this accounts for the large apparent increase in the prevalence of these two diseases. Our reasons for this conviction are as follows:

1. Instead of a small group of physicians formerly on our records as reporting contagious diseases we now have hundreds of names of physicians not formerly in evidence there.

2. Figures show that the increase has been less in diphtheria than in scarlet fever, and this was anticipated, as diphtheria was always better reported than scarlet fever, because physicians could not well avoid reporting those cases in which they obtained free antitoxin and free examination of positive cultures at the municipal laboratory.

3. The increase in both diphtheria and scarlet fever reports has been about what we expected, as our machinery for compelling reporting has gradually improved.

4. We do not get one-tenth of the complaints we did in 1904 and 1905, accusing physicians of concealing cases.

It has always seemed to me that a comparison of death-rates for different years on diphtheria and scarlet fever is subject to great error. The virulence of the particular strain of micro-organism causing the disease often varies so greatly from year to year that there are bound to be marked fluctuations in the death-rate, just as in smallpox.

The physician who conceals the diphtheria or scarlet fever patient until dead will rarely certify the correct cause of death, and in my opinion many of these patients were formerly buried as dying of non-contagious diseases.

We do not get as high a percentage of cases of scarlet fever reported as in diphtheria and we are still greatly handicapped by not having a municipal hospital for scarlet fever. How badly we need this hospital is

shown by the fact that in the past five months we have had 280 patients with scarlet fever in Chicago who were willing to go to the hospital, or else quarantine conditions were such that the patients should have been forced to the hospital.

Our requirement for period of quarantine in scarlet fever was formerly six weeks. We now send our disinfector in one month, if the attending physician requests it. Occasionally we send him even a few days earlier than this, if the doctor furnishes us a written statement that he has inspected the patient carefully and is positive that desquamation is complete and no complications present. Our Rule 24, which says, "Physicians representing cases ready for house disinfection when they plainly are not ready will be prosecuted," prevents abuse of written special requests for early termination of scarlet fever quarantine by disinfection.

To our surprise, we find the percentage of cases as "peeling" no higher than when we held to a six-weeks period before sending to disinfect.

CONCLUSIONS

1. Chicago has made enormous strides in management and control of diphtheria and scarlet fever since 1907.

2. Safeguards against extensive epidemics of these two diseases are as complete and effectual as can be obtained at the present low per capita cost.

3. The department receives reports of almost all cases of diphtheria and scarlet fever seen by physicians.

4. School inspection, strict quarantine and hospitalization are the three most valuable assets as municipal safeguards against epidemics of these two diseases.

5. A campaign against diphtheria and scarlet fever to give results must be a daily, continuous and ceaseless battle.

100 State Street.

WHAT CAN HEALTH DEPARTMENTS DO TO CONTROL SCARLET FEVER?

C. HAMPSON JONES, M.D.
BALTIMORE

My attention was first attracted to the question by observing the marked contrast in the tracings of the cases and deaths due to scarlet fever and diphtheria in Baltimore. The record of cases reported of such diseases was available for only a few years, commencing with the year 1891 and ending with the year 1909, making a period of nineteen years.

Previous to 1891, the death-record alone gives us any information, and this has been reproduced in the tracings for the two diseases as far back as 1875, when our burial law requiring death certificates to be filed at the health department went into effect.

DIPHTHERIA

If, now, we consider the tracing for diphtheria (including croup) we find the number of deaths in 1875 was 238, which increased almost steadily to 929 in 1882. Then the number decreased year by year until the low number 206 was reached in 1889. Again the death-line rises year by year until 428 deaths are recorded in 1892, which was almost equaled in 1898 with 412 deaths, since which time the death line has decreased steadily until 1908, when only 64 deaths occurred. This decrease in the number of deaths of course was directly due to the free distribution of diphtheria antitoxin, which was commenced in 1895, but the use of this curative agent did not become general until 1898 and 1899.

The "case" line for diphtheria commences in 1891, when 1,031 cases were reported; it then fell, out of proportion to the number of deaths, to 346 cases in 1893; then it began to rise and in 1897 raised to 1,620 cases, which was 967 cases more than the year before, and continued to rise until 2,077 cases were recorded in 1898, since which time the number has decreased each year, with three exceptions (when there were 1,858, 1,461 and 1,172 cases respectively) until the low mark of 756 cases was reached last year.

The increase of recorded cases beginning in 1895 and ending in 1898, was undoubtedly due to three causes:

1. The return of the natural increase.
2. The opening of the Health Department Laboratory.
3. The distribution of free antitoxin.

The first cause probably has as a prime factor the increase of non-immunes.

The second cause was the use of the laboratory to assist in diagnosis, thereby acquainting the department with many cases that might not have been reported otherwise.

The third cause induced the people to submit more rapidly to the placarding of their houses in order to obtain speedy relief, thereby again increasing the number of reported cases.

The decrease of recorded cases since 1898, when there were 2,077 cases, down to 756 in 1909, was due to the following factors:

1. Free antitoxin.
2. Throat inspections by cultures taken by the health department before fumigation.
3. House placarding (commenced in 1898).
4. Fumigation.
5. Semiweekly notification of school teachers of cases, with instructions to keep other children of the same house away from school.
6. Permits to return to school issued by the department only.

The number of reported cases, while showing a steady decline, yet remains higher than the number previous to 1898, due, we believe, to the fact that the use of the laboratory and the free antitoxin insures now the reporting of all cases of diphtheria, which did not formerly occur. Indeed, we have good reason for believing that many cases reported as diphtheria are not that disease.

SCARLET FEVER

Scarlet fever tracings are considered for the same number of years as the diphtheria tracings, and under the same conditions; i. e., the death line, commencing in 1875, and the case line in 1891.

Owing to the discovery of certain clerical errors in records previous to 1891, one should not place absolute confidence in the correctness of this scarlet fever "death" line, but there undoubtedly was, from 1875 to 1909 inclusive, a corresponding reduction (but probably not to the same degree) in the death-rate due to scarlet fever per 1,000 inhabitants in Baltimore, as occurred elsewhere. This reduction is shown in Table 1, originally published in a paper by Dr. Sidney Davies, which gives the record of the scarlet fever death-rate in London:

TABLE 1.—SCARLET FEVER DEATH-RATE IN LONDON PER 1,000 POPULATION

Year.	Death-Rate.	Year.	Death-Rate.
1861-1870	1.13	1895-1900	0.14
1871-1880	0.60	1901-1905	0.11
1881-1890	0.33	1906	0.11
1891-1895	0.24		

The probability that such a reduction in the death-rate per thousand of population is indicated by the small number of deaths in Baltimore due to scarlet fever from 1885 to 1909, inclusive, during which time the number of deaths varied from 85 to 11, except in the years 1891, 1892 and 1904, when there were 138, 258 and 143 deaths respectively.

The case-rate per thousand population, however, does not show so satisfactorily and we do not find any indi-

cation of a control of the number of cases such as is shown in the diphtheria record.

Commencing with 1891, the number of cases of scarlet fever reported each year was as shown in Table 2:

TABLE 2.—NUMBER OF CASES OF SCARLET FEVER IN BALTIMORE

1891.....1,512	1898..... 588	1904.....1,212
1892.....2,713	1899..... 434	1905..... 615
1893..... 406	1900..... 402	1906..... 577
1894..... 999	1901..... 391	1907..... 436
1895..... 775	1902..... 480	1908.....1,312
1896..... 694	1903.....1,224	1909..... 456
1897..... 928		

In studying this "case" line it must be borne in mind that some reduction in the number of cases reported since 1898 is due to the placarding of houses and to the school reports, because in 1898 we commenced to placard houses and added from time to time new regulations, and now we make the following requirements:

1. Placarding of houses.
2. Semiweekly reports to school teachers excluding all children in the infected house until released by the health department.
3. Fumigation.
4. Health department certificates permitting children to return to school.

Inasmuch as we have no counteracting influence, such as the giving out of a free antitoxin practiced in diphtheria, that would tend to reduce the reporting of all cases of scarlet fever, there probably are many cases not reported.

These four regulations, however, seem not to produce any lasting control, as evidenced by the "case" line from year to year. It is no doubt true that the regulations lessened the total number of cases each year, but not to such an extent as to warrant us in believing that they would prevent another epidemic like that which occurred in 1892.

The case-rate per thousand population in Baltimore during the past nineteen years was as shown in Table 3.

TABLE 3.—SCARLET FEVER CASE-RATE PER 1,000 POPULATION IN BALTIMORE

Year.	Case-Rate.	Year.	Case-Rate.	Year.	Case-Rate.
1891	3.10	1898	1.19	1904	2.28
1892	6.04	1899	.86	1905	1.12
1893	.86	1900	.79	1906	1.04
1894	2.06	1901	.75	1907	.77
1895	1.64	1902	1.91	1908	2.39
1896	1.45	1903	2.32	1909	.79
1897	1.91				

It appears also from this table that no real control of the disease exists.

As far as I have been able to compare other American cities with Baltimore, it is noticeable that in them also is the same want of control of the number of cases, even in those cities where the hospital accommodations for scarlet fever is provided and to a great extent used by the public. In this connection it is interesting to note that even in London, where it is said that nearly 90 per cent. of all cases are cared for in hospitals, there is a similar want of control. Table 4 is taken from Dr. Sidney Davies' article:

TABLE 4.—SCARLET FEVER CASE-RATE PER 1,000 OF POPULATION IN LONDON

Period.	Case-Rate.	Period.	Case-Rate.
1891-1895	5.3	1900-1905	3.6
1895-1900	4.4	1906	4.3

It would seem, therefore, that something more is needed than the four regulations above cited in common use in our cities, and the hospital isolation practiced in a few of them.

It is well known that the case mortality in scarlet fever during the last twenty-five years has been markedly less than in the previous years. In London this has been noticed since 1860, and this decrease in the mortality has been attributed to the improvement in sanitary conditions; but there has not been a corresponding decrease in the number of cases, although great reduction in the number has been produced by notification and isolation. It cannot be doubted that if notification and isolation were more rigidly carried out by

physicians and health officials, a much greater reduction in the number of scarlet fever cases, or in other words, better control of the fever could be effected by health departments.

Why is it that a greater percentage of the cases are not reported? The following reasons may be given:

1. Mildness of attack, which results in many cases not being correctly diagnosed, and in many cases not being seen by physicians.

2. The opposition to house placarding among patients and their families for selfish reasons. Because of this opposition physicians do not report cases when they have doubt as to the correct diagnosis, and they give their patrons the benefit of that doubt.

3. The length of time a house is placarded or quarantined for each case. This difficulty is a serious one from the family's standpoint and we need very much enlightenment as to the length of time a patient is dangerous to others after the fever has disappeared.

If these difficulties are successfully overcome and proper isolation maintained, it is reasonable to believe that not only will epidemics be prevented, but the number of cases will be kept at the minimum.

To overcome the first difficulty, i. e., the "mildness of attack" two things at least are necessary—(1) proper instruction of the public; (2) proper training of physicians.

The Proper Instruction of the Public.—The method of giving such instructions will vary in different places, but the knowledge to be imparted consists of essentially two fundamental principles; (*a*) that scarlet fever, like all infectious fevers, may vary widely in severity, from an apparently simple sore throat to the so-called fulminating form producing death in a short time; (*b*) that all sore throats are communicable. We know of course that this is not strictly true, yet for practical purposes it makes a good working basis for the prevention of spreading disease.

The Proper Training of the Physician.—This consists, first, in an opportunity when a student to study clinically all so-called minor infectious diseases. A municipality should therefore not only make provisions for properly equipped hospitals for infectious diseases, but also should afford ample facilities for the instruction of students, because in the end the people are the gainers, not only by return to them of able physicians to treat such diseases, but also physicians who will more readily recognize such diseases in their milder forms.

The second difficulty, i. e., house placarding, is one that is at once overcome when all physicians are made to believe that in the end they are gainers by reporting scarlet fever promptly. Is it not true that there are but few physicians who do not dread being called on to care for such patients, and in consequence of such feeling are apt in one way or another to neglect them, thus causing increased danger to the patient and others.

The third difficulty, i. e., the length of time a house must remain placarded, is one that can be overcome only by more exact knowledge concerning the length of time that the scales of desquamation remain infectious. Until the germ of this disease is found it is impossible for department laboratories to assist the physician in raising the house quarantine until the desquamation has ceased, which frequently is prolonged to four, six, eight and even ten weeks. This long quarantine necessarily produces much hardship, especially to the poorer people who can least afford it, and also promotes ever-increasing carelessness as the weeks go by because of the difficulty of segregating children who are perfectly well although peeling and presumably dangerous to others. Dr. S. G. H. Moore, D. P. H. Medical Officer of Health, Huddersfield, in a paper on the subject[1] advocates the disregarding of the state of desquamation if all affection of the mucous membrane

1. Public Health, London, 1908, xxi, 148.

of the nose and accessory cavities has disappeared. By following this suggestion he reduced the duration of stay in hospitals from an average of 44.3 days to 29 days. His views in the discussions of his paper were antagonized by many, who, however, did not present facts to show how long the squamæ are infective. If, however, the desquamation period is dangerous throughout its entire length, or only in the earlier stages, it is important that all should recognize that the very mild cases of scarlet fever frequently show no desquamation even until near the end of the third week after the elevated temperature has disappeared. If the germ of the disease is in the squamæ of epithelium, it is obvious that the use of antiseptic baths during and after the febrile stage in all cases is indicated so that the danger may be reduced to the minimum should the quarantine be accidentally removed before desquamation has ceased.

All the difficulties that have been presented in this paper have, I fear, too much influence on health departments and cause them to exercise supervision over scarlet fever with much less enthusiasm than they do over diphtheria. I believe, however, that health officers can control the disease much more effectually under the following conditions:

1. If they endeavor to instruct the people through every channel of education that their protection for the present lies mainly in their own efforts; that they must consider all sore throats as dangerous to others; that the danger lasts during the entire period of desquamation; that this danger is lessened by antiseptic baths; that the infection of air-passages and accessory sinuses frequently continues longer than the period of desquamation; that isolation is the only means of preventing the spread of the disease.

2. If they urge not only the establishing of municipal hospitals for scarlet fever, but also advocate the early removal of all cases of the disease to it wherever proper

isolation cannot be successfully established at the patient's home.

3. If they urge on the people correct information concerning the serious results, such as deafness, endocarditis, nephritis, etc., of even mild cases of scarlet fever.

4. If they urge on medical teaching institutions that medical students should not be granted diplomas until they have studied cases of infectious diseases under competent instruction.

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ABSTRACT OF DISCUSSION

ON PAPERS OF DRS. RAWLINGS AND JONES

DR. B. FRANKLIN ROYER, Harrisburg, Pa.: I think that boards of health and public health officials lay entirely too little stress on the proper observation of scarlet fever cases at the end of quarantine and on proper inspection of the oral and aural passages. For a period of years when I had charge of the Municipal Hospital in Philadelphia we watched carefully the cases that were discharged and never had return cases come from homes where patients had gone that still had some desquamation about them, provided the nose and ears were healed. I believe that as a practical working basis it is well to continue quarantine until desquamation has about ended. In every case coming to the hospital after a previous case had been returned to a home we were able to find either a discharging nose or running ear in the discharged case. I am inclined to agree entirely with Cameron (who made a most important study in London of "return cases," publishing a splendid report covering 120 or 130 pages on the subject), that the peeling skin after a month of illness is not dangerous to the public. Nasal discharges and ear discharges are highly contagious a month after illness.

I wish we knew more of the methods of dissemination of scarlet fever. There must be some epidemiological factor that influences the prevalence of the disease as well as influences its death rate. Certainly it is true, if we study morbidity rates and mortality rates over a period of years, that we will find intervals of rise and fall, just as we find unusual prevalence of variola at intervals of about ten years. Some unknown influence permits it to get a foothold and some unknown influence changes its virulence.

DR. H. W. HILL, Minneapolis: I would like to suggest, with regard to the infectiveness of scarlet fever scales, the possibility that the scales of the hands, since they get on them the discharges of the throat, may be infective by direct carriage

of the mouth discharges, while scales not so infected may be—probably are—harmless.

DR. H. DELAMATER, Kansas City, Mo.: We started our medical school inspection this year with a limited number of inspectors, and the medical inspection of the public schools had a great deal to do with suppressing the epidemic. We had, I believe, in one month 123 cases of scarlet fever. In a territory which comprises several nationalities, there were about 7,000 school children. It was found impossible to make physical examination of all the children as we started to do. We could not successfully do so and keep track of the number of scarlet fever cases that would develop. Instead, when a teacher or principal of a school would report to one of the inspectors that little Johnny Jones had been absent from school for three or four days, the inspector would at once visit the home and inquire why the pupil was not attending school. Investigation proved in many instances that it was a well-developed case of scarlet fever that had never been reported to the health department.

The medical inspector would call up the attending physician and inquire if he had seen the case, if so, why he had not reported it to the department of health. By constantly keeping watch over these suspected cases, in this manner we managed in four schools with about 6,000 pupils to have one school (the Washington) in which the attendance is composed largely of Hebrew and Italian children, to have only eighteen cases of scarlet fever. In another school with a population of which 95 per cent. are Italians, we had six cases, and in one parochial school we had eight cases of scarlet fever. I am convinced that in order to control the scarlet fever epidemic, a close medical inspection must be made of the public school children. I believe in cases of scarlet fever, patients suffering from nasal discharge are often released too soon from quarantine, thereby causing great danger of infection to others.

Quarantine in scarlet fever, is in my estimation, a hardship on poor people. This phase of the subject has not been given careful consideration.

If quarantine is maintained for a period of from thirty days to six weeks, the wage-earner of the family will be deprived of his daily wages and his family of its support. This would make it impossible to secure the necessities of life, unless he appealed to charitable organizations therefor. During the past winter where a release was asked from quarantine in case of scarlet fever, before the regular quarantine period had terminated, instructions were given the medical inspector to visit each case and if he found an absence of desquamation and discharge from the upper air-passages, a disinfection of the home was ordered and a release issued.

DR. R. M. WINN, Hannibal, Mo.: In rural districts where we have no bacteriologic examinations, I should like to ask

how long quarantine should be kept up after diphtheria and scarlet fever? Of course, there is no scientific way of determining that without a bacteriologic examination.

DR. G. KOEHLER, Chicago: In our experience in the Chicago Department of Health we frequently find diphtheria bacilli in throats of contacts that had been immunized with antitoxin. This method alone is not sufficient to prevent the spread of disease, if it is not combined with the making of cultures.

DR. SENECA EGBERT, Philadelphia: I would call attention to what Newman has said about milk being a carrier of both diphtheria and scarlet fever. Several epidemics have been traced by Newman to milk carriers.

DR. B. FRANKLIN ROYER, Harrisburg, Pa.: Are your inspectors permitted to release patients from quarantine if they have a discharging ear or a running nose?

DR. I. D. RAWLINGS, Chicago: One point in connection with Dr. Jones' paper. We find where we have discovered cases of scarlet fever in the "peeling" stage among the pupils in a given room at school, if the duration of the disease has been twenty-five or thirty days or more, and we expect a crop of scarlet fever, it usually does not materialize; but we do find that where a child with scarlet fever of perhaps a week's duration has gone back to school with throat and nose highly infectious, or early in the peeling stage, then we do reap our crop of cases.

Strict quarantine works a hardship to a certain extent, but not as great as one would suppose. Very frequently we can isolate the patient and the attendant with toilet facilities in the rear living rooms and by sealing a door and disinfecting the front portion of the premises, leave a place for the workers to live in front if they provide their meals and toilet facilities outside. If the family elect to send patient to hospital, they escape these hardships.

In reply to Dr. Hill's question, there was a time in Chicago when very few cases of diphtheria or scarlet fever were reported. Rather than not have reports, we thought it would be better to have a record of the case, even if nothing was done; so to obtain reports we allowed physicians to assume the responsibility of preventing the spread of contagion and did not placard, if the physician said he was willing to assume this responsibility. It did good for a time; we obtained reports and physicians were in a measure on their honor; they did their best to try to instruct families as to quarantine; but gradually there came a time when they would write in the word "assume" and forget the instruction part of it, and nothing practically was done.

As to duration of quarantine of scarlet fever, that is a mooted question. In Chicago we, as a rule, quarantine until they are through peeling and free of all complications.

We guard against milk epidemics by furnishing to the food bureau each day the name and address of the milkman in every case of scarlet fever and diphtheria. These are tabulated by weeks, and if there is found an unusual percentage of cases on any one milkman's route, the supply is immediately investigated.

DR. C. HAMPSON JONES, Baltimore: In my paper I attempted nothing concerning the methods of health departments to control the disease. I merely wished to call attention to our method and stimulate inquiry to improve by making our house quarantine method more exact.

Concerning diphtheria, permit me to say that this high point in diphtheria in the year 1898 was the time I took charge of the work. At that time the methods that were put into play seemed to produce direct results. In cases of diphtheria I do not believe there is any reason at all for an epidemic in a city where there is a good number of men in the health department to do the work.

Concerning scarlet fever, we practice what is extensively practiced elsewhere. I believe that we follow up the cases fairly well (that is, the reported cases); prompt placarding of the houses is practiced, instructions are given to the people, and the rooms finally fumigated; yet I don't believe that such methods will result in lowering scarlet fever as has been done with diphtheria, for the reason that the early conditions in the children with scarlet fever spread the disease before the department is notified. Time and again we have taken convalescent, desquamating children in the street playing with healthy children, yet there has not been a single case developed from them as far as we could ascertain. Why, I am not prepared to say.

THE RÔLE OF OBSTETRICS IN PREVENTIVE MEDICINE

W. P. MANTON, M.D.
DETROIT

With rare humor Dr. Oliver Wendell Holmes once wrote a prescription for longevity. Arriving at 60, to attain the ripe age of 80 "become the subject of a mortal disease," he says; but he fails to enlighten us as to how we may reach the year at which to begin his remedy. It is the object of every living being to lengthen life to the utmost, and in this prolongation of existence lies, with qualifications, the success of the state and the race. But as from the intervention of disease, few attain to that period when "every man with his staff in his hand for very age" marks the decline of usefulness, it is the object of preventive medicine to attempt so to safeguard life that it may be lengthened out to four-score years and ten of normal existence. Every century sees improvement along these lines, for increasing knowledge of disease brings with it the power and ability, not only to cope with existing conditions, but to anticipate and forestall those disorders which in their course tend to premature death or functional disability—a condition so nearly allied to non-existence as to render its subject of little or no value to society.

"To prepare us for complete living," says Herbert Spencer, "is the function that education has to discharge," and it is only through the education of the people and the profession—and one is sometimes inclined to agree with Gowers that "knowledge filtrates slowly through the profession"—that results can be attained in the uplift of the whole.

The subject which has been assigned me, the rôle of obstetrics in preventive medicine, is so broad and comprehensive that in the time allowed for its presentation I can hope only to touch on a few of the well-known facts, leaving much of profit to be brought out in discussion.

DEFINITION OF OBSTETRICS

Ask any ten men in the medical profession what they understand by the term "obstetrics" and the majority will give the dictionary answer, the care and attention rendered woman at the time of childbirth. But this is obviously too narrow and restricted a concept, for it has regard to only one of the actors in the drama, the mother, while the child, in which are grouped all of individual, family and national potentialities, is ignored, and the father left entirely out of the question. It is evident that if obstetrics has a place in preventive medicine its definition, in its broadest sense, must include all of those factors which enter into the production of children and the employment of all of those agents which make for strong and healthy bodies and sound mentality. Thus defined, the scheme of obstetrics would embrace the whole of the life of woman from gamete existence to climacteric accomplishment, the child from conception to birth, and to an extent the man also. By this we may understand that the obstetrician's duty does not begin and end with the delivery of the parturient, but reaches back to a consideration of heredity, and the study of antenatal development and pathology, including all of those conditions which make for the welfare of the child.

And it thus becomes evident that the science of obstetrics is complex, and so mortised with biology, pathology and general medicine that it is inseparable from either of these, and that while, like the colors of the spectrum, each component part is susceptible of analysis,

each is so blended and interwoven with the others that it is only when taken together that a complete and luminous whole is possible.

EUGENICS

Whatever may be our views regarding the inviolability of the germ-plasm, it is certain that characters and tendencies are handed down from generation to generation, and that disorders manifested in the parents may be reproduced in their progeny. The breeding of best to best must result in the production of the best, while, conversely, the issue of bad and bad or bad and good cannot attain to the same standard of excellence, even with the aid of "ancestral pull."

Stirpiculture may not be as readily directed in the human species as in the lower animals, and yet a persistent propaganda by way of suggestion, warning and advice on the part of physicians would in ultimate outcome be of greatest profit. If the marriage of those possessed of a family "taint," of the consanguineous, and of the socially and morally unfit could be prevented, eugenics would be advanced, the results for good would be incalculable, and the financial saving to the state enormous.

Inherited weakness in man, and especially in woman, is often magnified in the products, for, as Thomson observes, "an individual inheritance is a mosaic of ancestral contributions." Fortunately, sterility often puts a stop to further degeneracy along these crooked lines; and in the interval preventive medicine attempts its best to bolster up a feeble and tottering organism. And this is worth while, as, according to Hamilton, where a "vicious line is introduced it may die out, and probably does in most cases die out by interbreeding with a series of pure stocks;" even if "no reliance can be placed on its not recurring atavistically, it may be generations after."

Prophylaxis, therefore, must begin with life before birth and continue during the period of reproductive activity; an undertaking of vast proportions; but why should not the relation of the state and the physician be reciprocal?

FACTORS INFLUENCING FETAL DEVELOPMENT

Although maternal impressions, as popularly understood, are probably scientifically impossible, it is well established that impressions are constantly influencing the child during the whole of intrauterine gestation. Our knowledge of these facts is not imaginary but is derived from laboratory experiments and investigation, pathologic chemistry and clinical observation.

From the beginning of pregnancy the anatomic barriers between mother and child are such that no particle of formed matter can pass from one to the other, but untoward tendencies, notably an unstable mental and nervous organization of the mother, and deranged maternal metabolism, may seriously interfere with the nutritive processes of the child, or produce diseases of the fetal structures terminating in maldevelopment of organs, which end existence or prevail in crippled function throughout life. Morbid conditions arising within the placenta itself may prove, not only injurious or fatal to the fetus, but of serious consequence to the mother (hydramnios, hydatidiform mole, etc.).

It is also demonstrated that continued or repeated violence to the nested ovum is capable of producing malformations and monstrosities, and strong mental emotions, fright and traumatisms of the mother not infrequently lead to maldevelopment of body and mind in the offspring.

The placenta has been found not to be the perfect filter, as was formerly supposed, for morbid germs pass through its substance and invade the fetus, giving rise to the same diseases as suffered by the mother or to equally serious conditions (syphilis, tuberculosis, septic

infection, smallpox, etc.). Other maternal disorders, the active agents of which may not be demonstrable in the fetal tissues and some of which may remain dormant for a considerable time after birth, sooner or later become manifested in postnatal life.

Again, toxic agents, for example, alcohol, tobacco and lead are responsible for fetal malformations and mental obliquities, frequently reappearing in successive generations. It is true that the presence of most of those antenatal disorders to which reference has been made cannot be diagnosticated during intra-uterine existence, and that malformations and monstrosities are largely due to errors of embryonic development, still, with the knowledge acquired from antenatal pathology, we are in position to apply anticipatory measures in the interests of both mother and child, and by prophylaxis and timely interference, to bring about results which, in a proportion of cases at least, must make for greatest good. In undertaking preventive measures, however, we must not lose sight of the fact that many antenatal conditions are dependent on circumstances antedating uterogestation, so that to insure somewhat of success preventive steps must be inaugurated before the advent of conception. In other words, prophylaxis must be started with beginning postnatal life. Especial attention must therefore be directed to the proper management of the child, and efforts made not only to prevent or inhibit the diseases of that period of life, but also to eliminate as far as possible all those factors of the plastic years which may result in conditions inimical to future normal pregnancy and motherhood.

FACTORS INFLUENCING POSTNATAL DEVELOPMENT

"The rearing of healthy children," says Knopf, "is the most valuable asset to a nation's strength and prosperity," but this is impossible unless the whole cycle of reproductive life be included.

The sequelæ of the acute exanthemata and other diseases in the kidney and pelvic organs may have a bearing on fertility and the pregnant state, the one by possible influence on normal development of uterus and ovaries, the other by weakening organs on the integrity of which depends so largely the successful progress and outcome of normal pregnancy.

The influence of scarlet fever in the production of cardiac disease and as a direct cause of deaf-mutism, which in Great Britain is reported to reach as high as 23.5 per cent., may also be mentioned. Moreover, according to Gowers, "more cases of epilepsy are consecutive to scarlet fever (apart from the influence of nephritis), than all other acute diseases put together"; while Funkhouser has recently pointed out the importance of this disease as an etiologic factor in the causation of psychoses (postfebrile and exhaustive psychoses, dementia præcox, etc.).

Regarding other diseases of childhood which may lead to future obstetric disaster, much might be said, but I will confine myself to calling attention to one of the most important and far-reaching evils in this connection, namely, child-labor. Fürst has called attention to the relation between severe continued bodily exertion and uterine deviations and adnexal inflammations. During the formative years of life when the local organs are most susceptible to external as well as internal influences, the increase of intra-abdominal pressure from heavy lifting and straining, especially with overfilled bladder or rectum, favors pelvic congestion and displacements. If to these be added the nervous strain induced by monotony of work, as in factories, with the relaxation of tissues in a deteriorated body from unhealthy environments, lack of fresh air and liberty for out-door exercise, poor and insufficient food and a life of poverty, we have an array of agents the baneful operations of which cannot be overestimated. A recent writer in a popular publication has well summarized the ef-

fects of such unhealthful occupation. "The factory woman," she says, "if she is married, is too tired to show much attention to her home. She may give her baby drugged cordials to keep it quiet; most of her children die near infancy and those that survive are anemic. If she is not married she is likely to be some time, and she is using up energy that belongs to her children, to whom she will give an enfeebled life, and so bring down the general average of the race."

Were these the worst features that might be enumerated they would be bad enough, but of still greater importance to the future mother are the effects produced on the development of the pelvis in young girls—deformities and contractions—which may become evident only at time of parturition. In many of the conditions induced by child-labor the symptoms may at first be so slight as to escape attention, but their sequelæ are sure to appear later; in the unmarried in the form of amenorrhea, dysmenorrhea, endometritis, oöphoritis, salpingitis and the like; while after marriage they are shown in metritis, sterility, abortions, difficult or impossible delivery, etc., the maternal and fetal mortality and morbidity statistics of childbed being thereby largely increased, with a growing list of female morbidities met with in the clinics. If laws could be enacted and enforced controlling child-labor, the rôle of obstetrics in preventive medicine would be greatly lessened.

HEALTH AND DISEASE IN PREGNANCY

Pregnancy being, according to the books, a physiologic process through which most women pass without untoward event, the practitioner in the past has presumed too much on "Nature's" ability to take care of the gravida, and has therefore shirked responsibility. But the effect of the growing ovum on the maternal organism differs in different individuals, and it is wrong to assume that a process which may be normal in one is necessarily normal in all. As a matter of fact, of which

we are all cognizant, the border-line between health and disease in pregnancy is often a shadowy one, and unless the patient's health is closely supervised during the whole period of uterogestation serious complications may arise, which, in their culmination, may prove of gravest import to the mother, child, or both, with resulting discomfiture, mortification and regret to the physician. It is an old adage, but true, that "he who cures a disease may be the skillfullest, but he who prevents it is the safest physician."

Newell has called attention to two types of women with which the physician of to-day has to deal; one, the natural woman, generally of the poorer class, in spite of privations and hard work, preserving a vigorous and healthy body and ignorant of nerves, goes through her pregnancy and labor with the least possible difficulty and without after reaction; the other, the "overcivilized" woman, in whom the nervous system is exaggerated and overdeveloped—whatever may be her somatic state —stands the trials of pregnancy but poorly; the test of labor becomes almost a pathological process; and the woman too often, from the imposed strain, breaks down after delivery is accomplished. The latter is usually the product of the older communities, where social obligation stands first, antagonizing the rearing of healthy children, and imposing conditions the penalties for which are exacted by maternity. But into whichever class the patient may fall, she must not be disregarded during this greatest of tests of bodily fitness, and each patient must receive that care and solicitious attention which the condition demands. Knowing that every abnormal process, preceding or inaugurated during pregnancy, is presaged by some sign or symptom, the physician should be ever alert to detect the earliest evidences of threatening danger, and, by anticipating possible evils, seek to check those morbid showings which may lead to serious results. Women who exhibit or have shown in

former pregnancies, a tendency to pathologic complications should receive particular care and attention. In this connection much might be accomplished by the establishment of what Ballantyne calls prematernity hospitals, or the setting aside of special wards in existing lying-in institutions, where morbid pregnancies might be studied and "their treatment elaborated and placed upon a sure basis founded on experience." In such a hospital the poor would be cared for free of expense, and the well-to-do and rich placed under the most favorable conditions for a happy termination of a morbid gestation. The benefits to be derived from hospital treatment and supervision, especially in the instance of the working woman, under normal conditions, has been investigated by Pinard and others, and it has been found that the children of such patients, who were thus enabled to rest during the days preceding confinement, are heavier in weight, and undoubtedly healthier and stronger than the infants of those who engage in active work up to the onset of labor.

RESPONSIBILITY OF THE OBSTETRICIAN

Nature is said to be kind, for out of the thousands of women delivered annually, few, in comparison, suffer seriously from the disorders of pregnancy. The sins of omission may possibly be forgiven but not so those of commission, for which there is often little or no excuse excepting ignorance and unskilfulness. It is in the delivery of the patient that the physician displays his shortcomings most conspicuously. Into his hands are committed the lives of two individuals, and how often the responsibility is lightly assumed and without thought of fitness for the task! And yet how important to the future of the patient is the skilled conduct of labor, and how frequently is indifferent and sloppy midwifery responsible for years of suffering and ill-health in the after life of

the mother, while the child may perish or not as the case may be!

Midwifery is the golden key which unlocks future possibilities and success to the young physician by opening up opportunities to family practice which might otherwise be difficult or impossible to obtain. And yet it is safe to assert that, whatever may be the reasons assigned, in no department of medicine in which he is called on for conscientious and capable action is the beginner—and this unfortunately applies to many an older practitioner—less equipped and competent than in obstetrics. We demand that the educated and well-qualified physician, before entering into private practice, shall have had a hospital training in medicine and surgery, but who has ever heard it urged that he shall also round out his knowledge by experience gained in a maternity? The question when to interfere in delivery or when to abstain from active assistance, demands rare judgment and experience, as well as when by preventive measures may be gained the ounce of safety that is worth so many pounds of after-treatment.

If, as President Eliot says, the first duty of the physician is to prevent as well as cure disease, "the first step in prophylaxis," as some one cleverly remarks, "is to get a sufficient experience with what one wishes to prevent," and nowhere outside of a maternity hospital can this be so successfully accomplished.

Obstetrics has made great advancement during the past quarter century and the observance of asepsis and the larger knowledge of morbid conditions and their sequelæ which has been acquired have enabled the practitioner to afford assistance to the parturient under circumstances which in the past would have been impossible. As illustration, the interest which has been manifested within the past few years regarding the contracted pelvis is noteworthy as indicating the trend of modern obstetric thought and purpose.

MANAGEMENT

In the question of the management of such cases many different considerations are involved, and it is only by weighing the mortality and morbidity of mother against those of child, with reference to any given operation, that the one promising most satisfactory results can be adopted. A familiarity with the bony pelvis, being the foundation for a knowledge of treatment, leads to the consideration of those elements which conduce to the intra-partum safety of the mother as well as the safe delivery of the child. By careful pelvimetry, a study of the woman's physical and nervous make-up, and information gained as to the size of the fetal head in relation to that of the canal through which it must pass, the obstetrician is enabled to determine to a degree what may be expected at time of labor, and sometimes to inaugurate preventive measures which may secure relief, but always to prepare before hand for such intervention as may become necessary in the individual case.

While it is true that the interpolation of accidental conditions, which often cannot be anticipated, make "foreknowledge absolute," impossible, yet, the physician being to a large extent forewarned, the fault is his if in the time of need he is not also found forearmed.

The prophylaxis of the puerperium should be anticipated in pregnancy and in labor, for a clean gestation and a clean delivery usually sign for a healthy childbed. The occasional development of a pathologic state post partum must be met as it arises, but that many, if not most, of these are preventable incidents is within the experience of all. Unwise and uncalled-for tinkering by the physician—frequently resulting from alarm occasioned by a rise in temperature due to an overdistended bladder or rectum, to nervous irritation or some such trifling cause—are responsible to a large extent for the mishaps of the lying-in period. Only recently I have seen in consultation two cases of pelvic abscess which resulted, in each instance, from unnecessary curet-

tage, and which entailed weeks and months of suffering to the women, to say nothing of the apprehensive fears of physicians and families, and the unnecessary expense to those who were not in position to bear the burden.

MIDWIVES

The advent of septic infection in the lying-in woman has rarely an excuse, for the principles laid down by Holmes and Semmelweis, Pasteur and Lister, if carried out, make the occurrence of this disorder mostly preventable, so that the responsibility and blame for its presence must be borne by those who have the patient in charge. That the midwife, especially in congested districts, is generally accountable for the morbidity and mortality resulting from infection during and after labor, is evident from the reports of city boards of health. Miss F. Elizabeth Crowell, who personally visited 500 midwives in the Borough of Manhattan, New York City, found that of this number only fifty, or 10 per cent., could be qualified as capable and reliable, and those seen represented only about half of the practitioners in that borough.

We require that the physician shall have taken a prescribed course in a reputable medical school, the examinations of which he must have passed and later those imposed by a state board of registration, before he can legally enter into practice, and yet we permit, in many states without a question, an ignorant and dirty woman, such as depicted by Miss Crowell, "whose hands were indescribable, whose clothing was filthy, the condition of whose bag beggars description," to officiate in obstetrics, an important branch of medicine, and thus to slay and kill without one word of protest. Laws there are, which are enforced, for the protection of children, animals and birds, but the unfortunate mother and new-born babe are left unprotected to the mercy of the mercenary and indifferent. With all our vaunted philanthropy it would seem as if the times were ripe and

civilization advanced enough for legislative control of these carriers of disease and death, and it should be the especial concern of every physician having the welfare of his community at heart constantly to urge, in season and out of season, either the elimination of the breed, or, what seems more desirable, the creation of educational standards and state examinations and a supervision of midwives by legislative enactment.

DIFFICULT LABOR AND INFANT MORTALITY

The dangers to the infant incident to prolonged and difficult labor should ever be borne in mind, and early intervention in the interests of the child, when not inimical to the welfare of the mother, should be the rule of practice. But in carrying out such prophylactic measures it must not be forgotten that forceps and manual traction on the child are capable of much mischief, often resulting, if not in immediate trouble, in subsequent disorders of the brain and nervous system. The latest government statistics for the year 1907 and 1908 show that one-fifth of the deaths that occurred during that period were in infants under one year of age, while during 1908 more than one-eighth of a million (136,432) babies died in about one-half the total population of the United States. Ignorance and society have been largely responsible for the disastrous conditions which have heretofore prevailed, for, according to Prof. Irving Fisher, 47 per cent. of the diseases of the neonatus are preventable. Goussew states that in the Munich clinic 50 per cent. of antenatal deaths result from syphilis, and this disease undoubtedly plays an important part in the death-rate of early postnatal life.

FEEDING

It is also true that a large mortality results directly or indirectly from the improper feeding of the new-born. While for lack of something better, artificial food mixtures must be used in a certain percentage of cases, it

is universally acknowledged that breast-fed infants are better qualified to carry on existence and resist disease than those brought up on the bottle. The investigations of Tugendreich in this connection are of interest. This observer found that of 388 breast-fed babies in 64 families there was a mortality of only 19.8 per cent., while in 229 bottle-fed infants the death-rate rose to 43.3 per cent., a strong and unanswerable argument in favor of a fast-declining custom, maternal suckling.

INFECTIONS OF THE NEW-BORN

Nearly, if not quite all, of the infectious diseases of the new-born are preventable, the germ being introduced, as a rule, during or immediately following labor. Morse is of the opinion that the wiping out of the child's mouth by dirty fingers or contaminated cloths is a prolific source of evil. Twenty-seven years ago,[1] I called the attention of American obstetricians for the first time to a disease of great importance and danger, ophthalmia neonatorum, and urged its prophylactic treatment by the nitrate of silver method, just then worked out by Professor Credé of Leipsic. Two years later I again took up the subject,[2] but both of these articles apparently fell on barren ground, for, excepting the splendid work of Garrigues at the New York Maternity Hospital, little attention was given to the subject until more than twenty years later. The profession is now alive to the gravity of the condition, interest having been created principally through the efforts of the New York Association for the Blind and its special committees. When it is considered that one-quarter of the blind children in the schools for the blind of this country have been unnecessarily deprived of sight, the seriousness of the matter becomes apparent. Physicians, and particularly midwives, are responsible for loss of sight from this cause, and it is a matter of shame and

1. Am. Jour. Obst., October, 1883.
2. Boston Med. and Surg. Jour., Aug. 13, 1885.

opprobium to the profession that a single individual should be doomed to lifelong darkness when at the expense of a little trouble and the employment of so simple a preventive this might be absolutely prevented.

CONCLUSIONS

In the foregoing remarks I have attempted to indicate a few of the many conditions in which obstetrics plays an important rôle in preventive medicine. Surely, as "the child is father to the man," and woman the "treasury of the continued race," no pains which may be taken to preserve each in normality and health should be accounted too great.

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ABSTRACT OF DISCUSSION

DR. HENRY B. HEMENWAY, Evanston, Ill.: We well know that a large share of the diseases, particularly of the nervous system, are due primarily to heredity. For example, in London, speaking roughly, a large share of the mental defects, including epilepsy, and the ordinary neuroses, are traceable to the use of alcohol in the preceding generation. In Switzerland it is found that a large proportion of the children in institutions for the imbeciles and epileptics are begotten at a time when their parents are probably under the influence of intoxicants. During my practice I had a case of acephalus, the ante-partum history of which was as follows: During the third or fourth month of pregnancy the mother of the child attempted to stop a cow which was getting out of the barn, and was struck on the abdomen. I observed the case closely and I have no doubt but that the blow there caused hydrocephalus. Supposing that I had to deal with a very large amnion, I ruptured the membrane. When the child was born, I found that evidently I had mistaken the head itself for the membrane, and that the acephalic condition was the result of that injury.

When Dr. Manton first put forth his idea of ophthalmia neonatorum, some of us thought that perhaps he was a little bit visionary; but I think that facts have demonstrated that he was far-sighted. The danger of spreading the various infections through carelessness in the attendance on cases of confinement is illustrated by one instance which I remember. A physician attended a case of erysipelas, and went thence to three successive confinements and every one of those women died from what was familiarly called puerperal fever.

DR. P. M. TOWNSEND, Marshalltown, Ia.: We know that if the bone salts in the blood of the mother are ample and abundant, the bones of the child are well-nourished; but if for any reason there is a lessening of the bone salts in the blood of the mother, the bones of the child will be softer. The food of the mother before it becomes nerve tissue or muscle tissue, goes through a variety of processes, and is built up into more or less complex substances. The blood-supply of the child and the blood-supply of the mother presumably have the same composition in elemental food-supplies; the child's different tissues would therefore receive the same proportionate supply of food-elements; in that manner possibly those brain functions in the child would be best nourished which correspond with the brain functions active in the mother and therefore calling for a food-supply and influential in having the mother's blood contain a large proportion of such food-supplies as these activities require. The blood of the musician would be well supplied with such food elements as would nourish nerve tissue, whereas the blood of the woman whose time was taken up almost solely with washing would be well supplied with such food-elements as supply muscle tissue and we would expect from the child in the latter case a more thorough muscular development, but in the former case a better endowment of the nervous system.

We should educate for parentage as for any other social functions of the human being.

DR. C. W. STILES, Washington, D. C.: The relation between obstetrics and preventive medicine is a tremendously important matter in rural districts. In rural districts where I have been working in connection with other matters, it is the exception that the women in confinement see a physician; and I think that we can not infrequently trace back to the period of confinement the conditions that we find among some of our country children, and the later conditions in life of many of the farm mothers.

DR. ALLEN W. FREEMAN, Richmond, Virginia: I suppose our experience in Virginia has been that of all other health departments on this subject. We have walked around and around it, looking at it, realizing its importance, but not feeling quite like attacking it; but I think it is time for somebody with Dr. Hurty's nerve to open up operations. There is no doubt that tens of thousands of women are being absolutely murdered by ignorant midwives. Every one who has ever practiced obstetrics knows how filthy and dirty, how officious and meddlesome these women are; and we know what a tremendous total of fatal and crippling illness they cause every year. If we try to get rid of the midwife, the public takes the attitude that we are trying to get a little more money for the average practitioner and do the poor working woman out of her $3 or $5 fee; but we should not let that keep us back: we must tell the

people how many women these midwives are killing, and how much illness they are causing. I don't think people want to run the risk of being infected or killed by midwives; they run the risk because they don't know. The obstetrician and the health officers are the only people who apparently do know; and if we are going to be true to our duty, we must bring this information to them.

DR. C. HAMPSON JONES, Baltimore: The midwife question is one in which we of Baltimore and Maryland have been much interested for many years; and I am glad to say that at a meeting of the last legislature we succeeded finally in passing a law which will enable us to improve the situation a great deal. It provides an examination, supervised by the State Board of Health, after July 1 of this year; but all midwives who are now practicing and registered as midwives, can continue doing so after having been licensed by the state board, without examination.

Some years ago I wrote a short paper reciting cases of tetanus neonatorum; I think there were 32 cases occurring in one year; 28 were in children under 20 days old. Among those 28 cases, 12 occurred in the practice of one midwife; and on examination it was found to be undoubtedly due to the filthy condition of the woman's hands in treating the cord of the child. One very distressing case of tetanus was produced in the mother.

Midwives undoubtedly cannot be abolished, and I don't know that it is at all desirable to abolish them, because they attend cases which physicians do not want to attend, and in which trained nurses can not be employed. The institution being a necessity, therefore, we should undoubtedly regulate it legally. The number of cases that would be treated by midwives can be considerably lessened, I believe, if special care is taken by the managers or superintendents of maternity hospitals to separate carefully pregnant women who are married from those who are not married; the fact that a woman is poor does not mean that she is blind to the association with a woman who is not of the same character.

DR. WALTER P. MANTON, Detroit: For a good many years I have been chairman of a committee on the examination of midwives, in the Detroit Board of Health, and have come into contact with a great many of these people. We have no particular laws, and are practically helpless, but we are hoping to get a law through the next legislature governing the matter.

THE RÔLE OF OTOLOGY AND RHINOLOGY IN PREVENTIVE MEDICINE

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The otologists and rhinologists of this country have, I believe, a decided opinion that the ear, nose and throat have a rôle in the etiology of many general diseases, contributing directly in certain diseases and indirectly in others. Specific citations will be offered in the discussion of this important subject.

FUNCTION AND PATHOLOGY OF THE NOSE

The nose is both a respiratory and an olfactory organ. As a respiratory organ it prepares the air for the lungs, filters it, warms and moistens it. The normal mucus secreted from the nose, in addition to furnishing moisture for the inspired air, is a factor in digestion. It is especially true that gastro-intestinal disorders are not uncommon in very young children suffering from diseases of the upper air passages, and are due to putrefactive changes from the action of bacteria on the intestinal mucosa rather than on food particles.

Nasal stenosis produces a distinct reversal of Nature's method of respiration, that is, mouth-breathing, which when once forced on the individual, predisposes to general lowering of the resistance of the body, mental apathy, destruction of the blood cells, and diseases of the lungs. Individuals with obstructed nasal passages working in a dust-laden atmosphere are more prone to

the various forms of pneumonoconiosis than are those with normal noses.

Olfaction is an important physiologic function of the nose, directly influencing the sense of taste, both of which govern the ingestion of suitable foods for the maintenance of the body. Alteration in the sense of smell may directly affect the general nervous system or *vice versa*. The sense of smell is essential in certain occupations, and many industrial diseases, such as alcoholism, dementia præcox in musk workers, insanity, etc., are due to these occupations.

Hypersensitive points in the mucosa of the nose as etiologic factors in hay-fever and asthma are too well known to require other than passing notice. According to Professor Killian, these points are the anterior end of the inferior turbinate, the front part of the septum, the lateral wall of the nose, above the anterior end of the middle turbinate, and the upper end of the septum about the tubercle. The cure or relief of such irritation is in cauterization of these points with the actual cautery or trichloracetic acid. There is a form of nasal turgescence, vasomotor in character, simulating hyperesthetic rhinitis, which is dependent on a neurotic temperament, which in turn is irritated by exhausting mental work, sexual excitement, alcoholic indulgence and gastro-intestinal disorders.

The influence of acute or chronic suppuration of the nasal sinuses is especially far-reaching. There is an intimate venous anastomosis between the roof of the sinuses of the nose and the meninges and brain, sometimes producing meningitis, thrombophlebitis and intradural abscess, and predisposing to mental apathy, ocular and aural affections, bronchial and gastro-intestinal disorders. Sometimes, in a chronic suppuration of the sinuses, a dehiscence may exist in the roof of the sinus which permits the direct extension of infection to the meninges and brain. The effect of inhalation of foul

odors, often observed in patients suffering from a chronic suppuration of the sinuses, is certainly irritating to the lungs and nervous system. In these cases there is a low form of auto-intoxication present all the time.

The early local treatment of acute suppuration of any of the sinuses consists in the reduction of the swollen mucous membrane and establishment of free drainage, both of which are very essential. The early surgical interference in all chronic suppuration in the nose is most important. By such interference ozena, atrophic rhinitis, systemic disorders, and diseases of the lower air-passages are prevented.

Catarrhal inflammation of the skin, vasomotor erythemata, and angioneurotic edema may accompany, or alternate with, an acute inflammation of the nasal mucosa.

Leprosy, lupus erythematosus, lupus vulgaris, tuberculosis, rhinoscleroma and anthrax have a predilection for primary origin in the nose.

"Many of the infectious diseases, such as scarlet fever, smallpox, measles, diptheria, pneumonia, grip, meningitis, typhoid fever—due to infected dust—plague from an abrasion of the skin or mucous membrane and infection with the *Bacillus pestis* of Kitasato, and gastro-intestinal disorders, have their origin and atria of infection in the nose and nasopharynx. The nose of a healthy individual may possibly be a carrier of infectious diseases. This infection is more often carried through the air from the nose and throat of one individual to another than by the skin, and by hygienic measures could probably be prevented from securing a new foothold. We know that it is a matter of daily observation that many of the so-called catarrhal fevers respond much more rapidly when attention is given to frequently cleansing the nose and throat with mild alkaline douches and sprays. In scarlet fever and

measles many of the severe angiotic and aural symptoms are likewise mitigated."[1]

The prevention of many of the diseases enumerated depends on the application of the rules of hygiene, that is, frequent cleansing of the nose with mild antiseptic and alkaline solutions, free nasal drainage, and good general hygienic surroundings. It is, I think, quite true that both measles and scarlet fever are carried from the nose and throat of an infected individual. The condition of the nose and throat should govern the time of the isolation of the patient, rather than the appearance of the skin, and authors go so far as to express the belief that the skin lesion in scarlet fever is a sequence of the toxemia, which has its origin in the nose and throat. The many cases observed lead me to say the same thing of measles.

The fact that the nose (also the throat) is a carrier of the bacillus of diphtheria is well known. Unfortunately, no cleansing agent is known which possesses sufficient potentiality, in the strength endured by the nose, to destroy the organism. In the discussion of this subject, a very important point to remember is that a latent infection of the nose with the bacillus of diphtheria requires additional infection from a new organism to start an active inflammation. Therefore it is advisable to isolate for a short time cases of simple sore throat, especially in children.

FUNCTION AND PATHOLOGY OF THE TONSILS

The function of the faucial tonsils and of adenoid tissue which is found in the vault of the pharynx in most children at birth, is as yet imperfectly understood. That the tonsils sometimes allow bacteria to enter the tonsillar epithelium and lymphatic channels of the neck and also that they sometimes prevent the entrance of bacteria into the lymphatic channels, are undisputed facts. It may be that in a healthy tonsil bacteriolysins

1. Kyle: The Social, Hygienic and Economic Aspect of the Nose, Larnyngoscope, January, 1910.

and antibodies are produced in sufficient quantities to neutralize any bacteria or bacterial products which may penetrate the crypts or surface epithelium, thus preventing constitutional infection. In many cases some local or general condition may so irritate the tonsils as to allow infection to enter the epithelium or lymph-stream, producing local or general symptoms. There is a direct connection between the cervical lymphatics and the tonsils, and it is probably by this avenue that general infection spreads from the tonsils through the body, supplemented sometimes by the blood stream. It is observed that hypertrophied cervical lymphatic glands have a tendency in most cases to disappear on the removal of the tonsils in their capsule. *The size of the tonsils has nothing to do with cervical adenitis and general infection.* A small cryptic tonsil of a degenerative type is usually more productive of adenitis and general infection than large pedunculated tonsils, whose greatest harm is interference with normal respiration.

THE TONSILS AND TUBERCULOSIS

The question of the relation of the tonsils to tuberculosis is very important and the great majority of laryngologists believe that a relation exists. It is a reasonable presumption that the bacillus of tuberculosis may be found in the epithelium or in the crypts of the tonsils in a majority of cases of pulmonary tuberculosis. This, however, argues nothing. When we find evidence of tubercle bacilli in the tonsils, and swollen cervical glands, tuberculous in character, without observable lung involvement, the evidence is quite conclusive that the tonsil is the portal of infection. It is the opinion of Jonathan Wright, who is probably the greatest authority among laryngologists in this country, that "tuberculous cervical glands at the angle of the jaw are almost always secondary to primary tuberculosis of the tonsil." (G. L. Richards.)

From personal experience I do know that not infrequently patients have come under my observation suf-

fering from the general symptoms of incipient tuberculosis, that is, loss of flesh, general apathy and elevated temperature, in whom the tubercle bacilli were found in the cheesy deposits of the tonsils, and immediately after complete removal of the tonsils in their capsule, all the symptoms disappeared, with speedy restoration of the individual to health. I have also observed marked benefit to follow the removal of tonsils in cases of pulmonary tuberculosis in the early stage, in which tubercle bacilli were easily demonstrated in the sputum. Some patients apparently recovered. These patients gave a history of recurrent attacks of tonsillitis or irritation in the tonsillar region.

The direct connection of the cervical glands with the apices of the lungs makes it comparatively easy for the tubercle bacilli to seek the point of least resistance, which is the apex of the lung in many cases.

In those cases of apparent localized tuberculosis of the larynx, the removal of hypertrophied or ragged tonsils, which usually accompany such a condition, is marked by a cessation of many of the local symptoms.

A diseased tonsil, that is, one which is subject to recurrent attacks of tonsillitis, or in which the crypts contain bacteria, adds to an already existing pulmonary tuberculous infection sufficient new bacterial poisons to stimulate inflammation or to flame into activity a slumbering localized ulceration in the lungs. It therefore seems reasonable to me that in all suspected cases of pulmonary tuberculosis the tonsils should be inspected, and if possessing the slightest evidence of possible irritation, should be removed in their capsules. I think it is fair to say that simple tonsillotomy in such cases is an obsolete operation. The crypts of the tonsils extend to, or very near, the capsule, and a partial removal of the tonsil will do no good. The tonsils must be completely removed, thus sealing up the lymph-ducts which have their beginnings in the capsule or gland proper.

THE TONSILS IN RHEUMATISM

The rôle of the tonsils in the etiology of acute articular rheumatism has many advocates among laryngologists, and the majority, I believe, recognize a close relationship between acute tonsillitis and rheumatism. I have observed a number of cases of acute tonsillitis, follicular in character, which were followed by acute or subacute articular rheumatism. A few weeks ago I removed the tonsils of a young man who had suffered from six attacks of acute articular rheumatism, each following an attack of tonsillitis. It is, of course, too early to prognosticate the possibility of a return of rheumatism in this case. Other observers have reported an improvement in the rheumatic condition, acute or subacute, after the removal of the tonsils, very suggestive proof that the tonsils in a great many cases are an etiologic factor in acute rheumatism.

TONSILS IN OTHER AFFECTIONS

Many conditions such as endocarditis, meningitis, nephritis and appendicitis are reported as probably originating from a disease of the tonsils in certain specific cases. Such reports are not especially valuable, however, as the infection of the tonsils and the other organs at the same time or at a short interval, may have been only coincident. I believe, however, that there is good reason to suspect the tonsils, provided the diseases as cited above, follow in the wake of acute suppuration in the tonsils. The character of the infection in the tonsil evidently plays an important rôle in causing the spread of the disease and metastatic foci may be anticipated in cases of streptococcic infection.

PREVENTIVE MEASURES

Since the tonsils are a possible menace to the general economy, it would be better, I think, to remove at the earliest possible time those tonsils which are hypertrophied whenever observed in young children to produce

mouth breathing, and if the cervical glands are enlarged even small tonsils should be removed. In young and old that form of tonsil known as degenerative, in which the crypts are filled with a cheesy deposit and are subject to recurrent attacks of irritation, should be removed.

ADENOIDS

Adenoid tissue in the vault of the pharynx plays a part in causing cervical adenitis, though not so important as diseased tonsils. Acute inflammation of adenoid tissue occurs more often in young children. Adenoid glands sometimes have within their folds a cheesy deposit resembling that which is often observed in the tonsils. The drainage from adenoid tissue is much better than that from the tonsils and in consequence, inflammation of an active type is less frequently observed than in the tonsil. Inflammation and hypertrophy of the tissue in the vault of the pharynx predisposes to recurrent attacks of postnasal infection, deformities of the face, mouth breathing, deafness, Balnes' cough or nocturnal cough, infectious diseases, and, as pointed out by Ponthiere, Sydenham's chorea.

Bronchoscopy has opened up a new field for the better understanding of diseases of the trachea and bronchi. Some obstinate cases of asthma, which have defied all forms of treatment, have been reported as entirely relieved by application direct to the mucous lining of the bronchi. In addition, tumors of the trachea are sometimes treated as bronchial asthma, and a diagnosis can be established only by this method of examination. The presence of cicatricial bands in the bronchus, with partial or complete consolidation of the lungs, can by this method be established and thus empirical treatment of the lungs be prevented.

THE EAR IN GENERAL DISEASES

The rôle of the ear in general diseases is well established. A progressive deafness with or without tinnitus, is especially important as an etiologic factor in general

nervous exhaustion and many functional nervous disorders. Dr. Clarence Blake,[1] the dean of otologists in this country, says in regard to this subject:

> Few intelligent observers outside of the very deaf themselves, or those who have to deal much with persons so afflicted, can appreciate the profound exhaustion resulting from the effort to compensate for a deficiency in this particular line of communication with the outer world, in the person whose perception of that mode of motion to which we give the name of sound was once made without appreciable effort, and who has, under conditions of impaired hearing, first of all, to make an effort to hear, and, in default of hearing, an effort to appreciate vocal utterance by watching the motion of the lips of the speaker; and finally, in default, either through lack of perceptive power or through ability only to catch consonant sounds which are formed in front of the mouth, to solve the puzzle of the spoken sentence by filling in the missing consonant sounds, or, inadequately seen, from the appreciable context of the sentence; so that where once understanding came without effort, three distinct and appreciable brain-efforts are required: first, to hear; the second, to see; and the third, to understand.

In arteriosclerosis, the ear symptoms are sometimes the first to call the attention of the observer to this insidious and intractable disease.[2]

> "The ear symptoms which should direct our attention to a local or general circulatory disturbance, are unilateral or bilateral tinnitus, slight and progressive deafness, loss of air and bone conduction, dizziness, sometimes early in the disease, and in the later stages of the disease, sometimes hallucinations of hearing. The ear symptoms necessarily vary according to the extent of the sclerosis."

Another symptom belonging to the internal ear which is important in many diseases, is vertigo. Vertigo may or may not be associated with nystagmus, and may be continuous or alternating in character. If alternating, it may be said to be due to an explosion, as it were, in the center of equilibration situated in the cerebellum or semicircular canals, and is probably functional in character, and due to circulatory disturbances

2. Kyle, J. J.: A Study of Ear Symptoms in Arteriosclerosis with Special Reference to the Labyrinth, Annals of Otol., Rhinol. and Laryngol., June, 1907.

or gastro-intestinal disorders. If continuous, it is probably due to a destructive change in the center of equilibration or semicircular canals, which may result from a tumor or suppuration. Impressions producing functional vertigo travel to Deiters' nucleus by the spinal vestibule tract, the cortical vestibule tract or associated fibers of the cranial nerves.

Vasomotor ataxia, local in character, may occur about the auricle and adjacent structures from irritation of the different ganglia of the ear, causing hives, herpes, simple erythemata and sometimes angioneurotic edema, and we must be careful not to class such skin conditions as the local expression of a mastoiditis.

A suppurating ear as a cause of metastatic abscess in the brain, lungs, or liver is so well known that I need not dwell on this feature of the subject further than to remark that too often a general septic thrombophlebitis is attributed to some general infection rather than to a condition originating in a suppurating ear, which is only taken into consideration after the disease is well established and beyond surgical interference. A chronic suppuration of the ear is certainly a menace to life, and any rise of temperature or slight pain in the region of the ear affected should, in the absence of a distinct cause, be looked on with grave suspicion as orginating from the ear.

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ABSTRACT OF DISCUSSION

DR. ROBERT LEVY, Denver: Frequent examinations of the ear during cases of scarlet fever, measles, etc., should be a routine measure; and one often is rewarded, after such an examination, by detecting a redness or a bulging of the membrana tympani that indicates the otitic involvement. Early relief by a free incision will often prevent a permanent discharge from the ear and a consequent deafness through the rest of this patient's life, not to speak of complications such as mastoiditis, etc., which we all recognize as a consequence.

I would also like to impress, perhaps emphasize, what Dr. Kyle has said with regard to the size of the tonsil as indicative of disease of this organ. The most dangerous tonsils

to the welfare of the patient are those that are submerged; those that are not prominent and that can only be examined thoroughly by drawing forward with a retractor the anterior pillar!

Now, as to the finding of tubercle bacilli and tuberculosis in tonsils with cheesy discharge, my experience has not been in accord with Dr. Kyle's. It has been my experience that the demonstration of tubercle bacilli in tonsils and in these various discharges from the tonsils is an extremely difficult matter. I mean difficult, not from a technical point of view, but from the fact that they do not exist there; and even if they do exist, tubercle bacilli found in the crypts of the tonsils are not evidence of tuberculosis. They are there simply as they are in the nose; and we know that in the vestibule of the nose one finds not only tubercle bacilli, but other micro-organisms after contact with patients having the specific diseases. After your visit through a ward of diphtheria; after your presence in a tuberculosis hospital for any length of time or after treating many throats, you can demonstrate the presence of micro-organisms that are entirely inert so far as you are concerned; and so one must be careful how one defines tuberculosis of the tonsils in cases in which tubercle bacilli are demonstrated; at the same time, it is a fact that there may be histologic changes, the tonsils indicating the development of tuberculosis without being able to demonstrate the presence of the tubercle bacilli.

With regard to the removal of tonsils in its relation to the development, or to the recurrence, of rheumatism, I might say that occasionally one finds that immediately after enucleation of the tonsils a very severe attack of acute rheumatism develops. I have seen such instances; and I have also seen the development of a very intense chorea immediately after the removal of tonsils. In one instance the patient's rheumatism was followed by an endocarditis and a permanent heart lesion. In all of these instances, the operation was blamed for the result. I was the operator, and I have not to this day been able to assure these people that the operation was not directly the cause; but as a matter of fact, the operation did have a bearing. I believe that acute tonsillitis is a local manifestation of an infective micro-organism, which micro-organism is also the cause of rheumatism; and that the tonsils acting as portals of infection for this micro-organism, retaining this micro-organism in its passage into the cervical lymphatics, and then into the system generally, such tonsils take on an initial inflammatory condition which we term acute tonsillitis. And so, if a tonsil is infiltrated, as it were, with micro-organisms causing specific infection such as rheumatism or chorea, the attack on that tonsil by an operation brings about an intense virulence of the micro-organism, followed by absorption of the micro-organism and the resulting general rheumatism, chorea, or endocarditis.

DR. J. D. MACLAREN, Norman, Okla.: Many of the diseases which impair the efficiency of man are caused by microparasites which enter the human body through the skin and the mucous membranes. That the outer skin is very protective is proved by such a disease as lupus, in which the tubercle bacillus is kept outside. The access to the mucous membranes is chiefly through the nose and mouth.

Jundell has shown that in the normal trachea and lungs there are practically no living microparasites. His results have been verified by Anderson of Detroit in experiments on dogs in which the trachea is normally sterile, but becomes infected when the nostrils are mechanically kept closed. Though the secretions of the trachea and lungs are normally sterile, these exudations are good culture media for microbes. Hence the air must be sterilized in the normal air-passage through the nose and pharynx. When the nose is closed as in Anderson's experiments the air entering through the mouth does not have its micro-organisms destroyed or inhibited.

The nose is the air tube. The mouth is the food tube. Cannon has shown that the masticated food, during its stay in the fundus of the stomach, even before it is mixed with the acid secretions is not a good culture medium for microbes. When the cheeks, teeth, tongue, tonsils and swallowing muscles are normally used, the well-mouthed food and drink may stay an hour in the fundus of the stomach, practically sterile, under many conditions which favor microbic growth. The eyes and the facial sinuses drain into the nose. The nose, the ears, the mouth and the lungs drain into the pharynx which is protected by Waldeyer's tonsillar ring. Normally all these throat excretions are swallowed and digested. Rhinology and otology as well as stomatology and laryngology are thus important factors in preventive medicine.

DR. H. W. HILL, Minneapolis: I hear the term "vicious tonsils." I should like to know if there are any tonsils that are not vicious. I am constantly asked that question: Should not a child's tonsils be removed in any case?

DR. J. J. KYLE, Indianapolis: As to the question whether or not, or when, the tonsil shall be removed, especially in young children, I should say if a tonsil is hypertrophied and obstructive to breathing I would recommend its removal. In the young child suffering from cervical adenitis and inanition, I would recommend the removal of the tonsils. In the young child with simple hypertrophy of the tonsils without any obstruction to breathing and without any enlargement of the cervical lymphatics, I would leave the tonsils alone. A tonsil may possess some function that we do not quite understand; and with the presumption that it has a function, I cannot see the excuse for always removing it.

THE PERMANENT ELIMINATION OF YELLOW FEVER

J. H. WHITE, M.D
NEW ORLEANS

Where the means for combating any disease is made known, it is little less than criminal to let such agencies fall into disuse. The American Commission in Cuba placed the necessary knowledge directly at our disposal in 1900, and we have evolved the correct practice since that time to such extent that we no longer fear epidemic yellow fever, but there still remains a goodly share of the work to be done. Most of us have vaguely considered the question of total eradication—I among the rest—but no practical solution of all points presented itself to me until I recently had a talk with the one man who probably knows more of yellow fever than any other, and his remarks put me on the track of the final solution —to Dr. Carter, of our service, therefore, belongs entirely the credit for most that I shall say.

We find this disease in endemic and epidemic foci. Endemicity, to be maintained, demands:

(a) A sufficient birth rate to furnish a very steady, continuous supply of non-immunes (babies), and therefore demands for its habitat a city of considerable size, unless conditions are peculiar, as below.

(b) The supply of non-immunes may be existent in a smaller place through the presence of a constant influx of non-immunes from the back country. This is exactly the reverse of what has many times been stated, viz: that the Hinterland infected the coast town.

This latter erroneous impression I think Carter was the first to contravene.

Now, if we accept these two as the necessary corollaries for endemicity, it is readily seen that once endemicity is destroyed, we can also destroy *pari passu* all chance of epidemic occurrence. It has been fully demonstrated at Habana, Santiago, Cienfuegos, Vera Cruz, Rio Janeiro, Colon, and Panama that epidemic centers can be eliminated.

We know that the remaining foci are Cartagena, Sabanilla, Baranquilla, Bahia, Manaos, Para, Pernambuco, Santos, Guayaquil, and possibly the capitals of British, Dutch, and French Guiana on the American continent, and one or two points at most on the Gulf of Guinea, in Africa.

The total population of all these places will not exceed 1,500,000, and I am fully justified in saying that 5 mills per diem per capita would cover the cost, even at American prices, of holding these places in sanitary control—which control continued for a space of three years, at a total outlay of about $10,000,000, would mean that yellow fever. which has been the scourge of commerce for 400 years, would be no more, and maritime quarantine, save for plague alone, would become an unpleasant memory.

Such work would require cooperation with us on the part of the Latin-American countries and Great Britain, and, if Cayenne and Parimaribo are foci, of France and Holland; but I do not doubt the feasibility of obtaining all necessary cooperation, save for one of the Latin countries, since all but that one are on the best of terms with us, and even that one might be persuaded, in time.

The whole program could be summed up briefly as follows:

(a) Each center under one man's control, and he given full power to make a steady, insistent, and minutely exact fight on all Stegomyia breeding places.

(b) No attempt made to handle the sick, and so rouse the ire of the individuals.

(c) Be most careful to make it plain that subordinates shall annoy no one, and then see that they do not annoy.

The officer should approach the question of human carriers of the disease, if at all, solely through friendly suggestion to local authority, after getting on intimate terms, and then only to discreet officials, for fear of arousing opposition to his own particular work, which, in the end, would be absolutely sure of success. Could this be done, the medical profession would have to its credit an achievement that would be worth in money to the western world each year all of its cost, and to humanity more than can be estimated.

I wish to reiterate that I claim no originality in the foregoing, it being simply deductions from the splendid work of Colonel Gorgas, observations during my own work and, as before stated, Carter's suggestion. The idea of presenting such a conclusion having grown out of a statement made by Colonel Kean at the Atlantic City session in 1909, that we should wipe out yellow fever in ten years.

PUBLIC HEALTH ORGANIZATION IN NEBRASKA[1]

D. T. QUIGLEY, M.D.,
NORTH PLATTE, NEB.

The purpose of this paper is to report the organization of the public health officers of the State of Nebraska, to give the plan of the organization and to recommend the plan to other states where such a movement has not yet been made, rather than to recount the work already accomplished.

On June 8, 1909, in response to a call sent out, a large number of the city and county physicians of the state met in Omaha and organized what is now the Nebraska State Health Association. For several weeks before the meeting, and before the call was sent out, interest was aroused by the following letter, which was published in newspapers throughout the state:

HEALTH OFFICERS SHOULD ORGANIZE

North Platte, Neb.

To the Editor:—In line with the present rapidly developing sentiment in favor of the idea of preventing disease instead of attacking it after it has developed, and the spread of life-saving medical intelligence, I want to bring before the public the necessity of organization of the public health officers and the need of public support of such an organization after it has been effected. Much good would result if the public health officers of the state were organized and would hold regular meetings, where the ways and means for preserving public health might be discussed, improvements and advances noted, and the force of the organized body brought to bear on the enforcement of such regulation as might be necessary. City and county health officers have been inclined to be passive and very little work of an active and aggressive nature has

been done; but, in view of the fact that an enormous amount of the diseases that now afflicts the people of our state could be absolutely prevented, it seems reasonable to suppose that one of the first steps to secure more nearly ideal health conditions would be perfection of such an organization as I have cited.

D. T. QUIGLEY, City Physician.

This was followed up by a letter to every city and county physician in the state as follows:

CALL FOR STATE MEETING OF THE PUBLIC HEALTH OFFICERS OF NEBRASKA

To all city and county physicians and other public health officers of the state of Nebraska:

Dear Doctor:—This circular letter is sent to every public health officer in the state for the purpose of effecting a state organization. The need of such an organization is apparent when we realize that there is much to be gained in enforcing health regulations, if the city or county physician is backed up by a compact and well organized state association. This, however, is of minor importance compared with the benefits that will come to each community and the state by the wide dissemination of knowledge on preventive medicine that will result. The dominant note in all medicine to-day is prevention. There is much that is new in this field. Most of us can teach others something; we can all learn, and we shall all be better physicians and better health officers, if we get together and mix our experience and our learning. Nebraska, as a state, ranks first in the intelligence of her people; let us see that she ranks first in the intelligence of public health officers by making a good, strong association that will be a pattern for other states and do untold good by furthering the work of protecting our people from disease and death. We want to have this meeting as early as possible so as to get after the hot weather diseases, flies, etc., and that we may report what has been done at the Section on Hygiene of the American Medical Association at the Atlantic City meeting. June 8. The date set for this meeting, therefore, is June 7 and 8; the place, the Rome Hotel, Omaha. Return the enclosed postal, at once, stating whether or not you will be present. Get in as a charter member if possible. Charge your expense for the trip to your city or county. Very few will refuse to pay, if the benefit to the community from your presence at the meeting is explained to them.

DR. D. T. QUIGLEY, North Platte, Neb.

At this first meeting the subjects of tuberculosis, medical inspection of schools and the carrying of disease by insects, flies, etc., were taken up and fully discussed. As all the leading papers in the state had reporters at the meeting, the intelligence in regard to these diseases that was spread broadcast throughout the state amounted to a great deal, and health officers, even in districts not represented at the meeting, found it easier to enforce their regulations in regard to preventive measures. At the second meeting, which was held in Lincoln, a large number of persons who were not public health officers having become interested, the by-laws were so amended as to take in all interested outsiders as associated members, the only restriction being that they were not allowed to vote on any question involving the enforcement of any health regulations or rules. These associate members are very valuable in keeping up interest in health matters in their respective localities, and, in an association in which the active members hold office by political appointment usually only for one year, it seemed wise to make such a provision, if only to take care of the older members. The new health officer, coming in, is usually enthusiastic enough to seek membership, while the old one, going out, has learned to love the work well enough so that he will stay and give his colleagues the benefit of his experience. It will be seen that the possibilities for the growth of such an association are great.

The plan of the association is to spread knowledge of the prevention of disease in every way possible—by newspapers, lectures, etc. We expect to have a lecturer on public health at every chautauqua in the state this summer. The plan also includes the use of the influence of the association toward the passage of laws directed to the betterment of the public health, such as providing for a state lecturer on tuberculosis and venereal disease, the prevention of the marriage of the diseased, the idiotic and the insane, the prevention of the spread of

disease by railroads, providing for medical inspection of schools, providing for quarterly bulletins to be issued by the state board of health and sent to every tax-payer in the state giving seasonable information on the prevention of disease, etc.

It will be seen that there is much to be done, and much can be done by an association like this in every state. I addressed the governors' conservation congress in March on the need for this kind of legislation and was very glad to see that the conservation of human life stirred up more interest than any other topic taken up by the assembly. All the recommendations made were incorporated into the resolutions adopted by the meeting. An association of this kind in every state giving its endorsement to such measures as Senator Owen's bill would help much toward the passage of favorable medical legislation.

THE STRAUSS REACTION FOR THE DIAGNOSIS OF GLANDERS

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BOSTON

Since Strauss[1] in 1886 discovered the fact that when material containing virulent *B. mallei* was inoculated into the peritoneal cavity of male guinea pigs scrotal lesions developed, the method which bears his name has been very generally used.

A positive reaction followed by typical organisms and a typical culture is unfailing evidence of the presence of *B. mallei* in the material inoculated, while the failure to obtain the reaction is not proof that the horse from which the specimen was taken has not glanders. Hill and Burr,[2] and also Frothingham,[3] in 1901 called attention to the fact that frequently material from a horse which had glanders, as proved by autopsy, failed to give the reaction.

The bacteriologic laboratory of the Boston Board of Health makes free examination for any disease of a bacterial nature which is dangerous to public health. Our tests for glanders during the past four years have been respectively, 159, 208, 265 and 232, and of this number 301 or 34.4 per cent. were positive. The technic of examination is given in full that each step may be followed:

1. Strauss: Compt. rend. Acad. d. sc., 1889, 108, p. 530.
2. Hill and Burr: Am. Pub. Health. Assn. Report, 1901, p. 439.
3. Frothingham: Jour. Med. Research, 1901, No. 2, vi, 331.

TECHNIC

Outfits consisting of a box containing two sterile swabs in a tube, together with a card with blanks to be filled out by the veterinarian, may be found at any of the culture stations, of which there are about fifty scattered over the city. After use, the outfits can be left at the culture station to be sent in by the regular station delivery, or, as is more frequently done, may be sent at once to the laboratory.

On receipt, about 3 to 5 c.c. of sterile water is added and the swabs are thoroughly soaked, then by rotation, together with pressure, against the side of the tube, most of the material is left in suspension: the swabs are now used to inoculate a potato, after which a smear is made to show the kind and number of organisms present. They are then put in a pail containing 5 per cent. phenol.

With the suspension, two male guinea-pigs (those weighing at least 500 gm. being preferable) are inoculated intraperitoneally; one with 1 c.c. and the other with 0.5 c.c., unless there are myriads of organisms, or if streptococci are present, when half as much is used.

The reason for using two pigs is twofold, for frequently, as will be shown later, one pig will be positive and the other negative; and on the other hand, one pig may die of peritonitis, while the other will live and give the reaction.

All pigs under test for glanders are kept for a month, if negative, before a final report is made to that effect, although a tentative report is made at the end of a week.

All pigs under observation are examined at least twice daily for the first week, and when any change is seen the fact is noted on the card.

As soon as possible after the pigs show the Strauss reaction, autopsy is made, and all notes entered on the animal cards, which are then filed away with the original one filled out by the veterinarian. At autopsy, a culture is made from each testicle which shows a lesion, and when but one shows the reaction, two are made from that one, and smears are also made for microscopic examination.

SUMMARY

In summing up the work on glanders, I have first taken all the positives for the past four years, ending January 31, 1910, and second, all cases during the past year.

A summary of the 301 positive cases shows the following dosage:

Cases showing organisms and receiving 1. and 0.5 c.c.	258
Cases showing no organisms and receiving 1. and 0.5 c.c.	18
Cases showing myriads of organisms or streptococci, receiving 0.5 and 0.25 c.c.	25
	301

The result of the cultures made directly from the swabs, on receipt of the specimen, follows:

Culture negative in	132 cases
Culture positive in	32 cases
No notation on card	8 cases
No growth	3 cases
A mould present in	126 cases
Total	301 cases

It is noticeable that swab cultures from nasal cases are very apt to be overgrown by a mould.

The value of the swab culture is apparent from the fact that of the 32 cases in which the swabs gave a positive culture, 11 showed no lesion in the pigs by the third or fourth day, so were inoculated with a suspension from the surface of the potato, and in each instance there was a marked Strauss reaction on the second day following, and autopsy showed the characteristic lesions with typcial organisms microscopically, and typical cultures were obtained from the lesions.

The location of the lesions in the 301 horses from which the specimens were taken is here shown:

Nasal	133 cases
Other than nasal	155 cases
Both nasal and lesion elsewhere	2 cases
Location of lesion not given	11 cases
Total	301 cases

Table showing cases, dosage and result of swab cultures by years:

	1906.	1907.	1908.	1909.	Total.
Cases positive	51	75	93	82	301
Receiving 1 and 0.5 c.c.	51	73	88	71	283
0.5 and 0.25 c.c.	0	2	5	11	18
Streptococci present	2	1	7	10	20
Swabs positive, pigs positive	2	3	11	5	21
Swabs positive, pigs negative	0	2	3	6	11

	1906.	1907.	1908.	1909.	Total.
Suspicious bacilli present in examination of smears	10	17	32	18	77
Followed by positive culture	1	2	3	2	8
Followed by negative culture	3	10	12	7	32
Overgrown by mould	5	5	17	9	36
Showing no growth	1	0	0	0	1
Swab cultures negative	21	37	38	36	132
Swab cultures positive	2	5	14	11	32
Mould	20	30	41	35	126
No growth	3	0	0	0	3
No notation on card	5	3	0	0	8

During the year ending January 31, 1910, 232 specimens were examined for glanders. Of this number, in 193 instances the inoculation consisted of 1 c.c. and 0.5 c.c., while in the remaining 39 but half as much was used.

The life of the individual pigs together with dosage is rather interesting. In the 193 cases in which the pigs received 1 c.c. and 0.5 c.c.:

Both lived in	141 instances
The 1 c.c. pig died in	14 instances
The 0.5 c.c. pig died in	8 instances
Both died in	30 instances

In the remaining 39 cases, the inoculation was 0.5 and 0.25 c.c., and of these,

Both pigs lived in	15 instances
0.5 c.c. pig died in	8 instances
0.25 c.c. pig died in	4 instances
Both died in	12 instances

From the above will be seen the value of inoculating more than one pig, as in a total of 232 cases, there were 34 instances in which one pig died while the other lived. This is even more striking when we come to consider the individual pigs among the positive cases, as in only 33 instances did both pigs give a positive reaction.

For convenience I call the pig getting the larger amount the 1 c.c. pig, and the other the 0.5 c.c., even in the cases where they received 0.5 and 0.25 c.c.

Both pigs positive in	33 instances
1 c.c. pig positive, 0.5 c.c. pig negative in	20 instances
1 c.c. pig positive, 0.5 c.c. pig dead in	7 instances
1 c.c. pig negative, 0.5 c.c. pig positive in	8 instances
1 c.c. pig dead, 0.5 c.c. pig positive in	6 instances
Swab positive, pigs negative in	6 instances
Only one pig used in	2 instances

From this it appears that had the 1 c.c. pig only been used, but 62 positives would have been obtained, an error of 24 per cent., while had the 0.5 c.c. pig alone been depended on, there would have resulted but 49 positives with an error of 40 per cent.

Had a swab not been made, 6 cases would have been missed, an error of 7.5 per cent.

While the final positive result would undoubtedly have been obtained by submitting other specimens, it will be readily seen that this would have only been accomplished after a delay which in many instances might have exposed a number of horses to infection. In any large series of tests for glanders, lesions other than the typical Strauss reaction will occur, and a number of these were spoken of in a paper by the author[4] before the American Public Health Association in Winnipeg in 1908, and a number have since occurred.

The period from inoculation to development of lesions varies considerably. Thus, of the 1 c.c. pigs:

6 showed well developed lesions on 2nd day
23 showed well developed lesions on 3rd day
13 showed well developed lesions on 4th day
3 showed well developed lesions on 5th day

Three on the 6th, two on the 7th; one on each of the following: 8th, 10th, 17th, 22nd, 28th, 31st, 34th, and two on the 25th.

Of the 0.5 c.c. pigs:

6 showed lesions on 2nd day
11 showed lesions on 3rd day
11 showed lesions on 4th day
10 showed lesions on 5th day
1 showed lesions on 6th day
3 showed lesions on 7th day
2 showed lesions on 8th day

One each on the 9th, 18th, 23rd and 25th days, respectively.

Of the delayed cases, i.e., over 7 days, but two had a typical Strauss reaction, and in but two other cases was there any testicular involvement, and in each of these one testicle was converted into an abscess, there being but a thin wall, the interior being creamy pus, and *B. mallei* being recovered in pure culture.

There was a tumor at the inoculation site in 6 cases; twice an inguinal gland was involved; once a tumor was

4. Arms: Am. Jour. Pub. Hyg., August, 1909, xix, 570.

found in the omentum and once in the mesentery. In these freak cases none is considered positive without a culture and animal test with a typical Strauss reaction.

Three things are required for the diagnosis of glanders: typical Strauss reaction, typical organisms from the lesion, and typical cultures.

While there is a marked variation in the *B. mallei* on artificial media, the organisms direct from the lesions are characteristic, taking the stain (Loeffler's M:B) irregularly.

CONCLUSIONS

1. In the diagnosis of glanders by the Strauss method it is better to use more than one guinea-pig.

2. Before inoculating it is well to make a microscopic examination as a guide to dosage.

3. A culture from the swab often aids in the early diagnosis,

4. Pigs should be kept under observation for a month, and if a lesion of any kind is present, autopsy should be performed and cultures made.

30 Huntington Avenue.

PELLAGRA

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While engaged in the study of 130 cases of amebiasis (amebic dysentery) during portions of 1907, 1908 and 1909, at the Marine Hospital in San Francisco, it was noted that the majority of the patients showed symptoms of secondary complications. Some complained of rheumatic pains and neuralgias; others complained of headache and indigestion and became constipated at times; others showed lesions on the hands, feet and legs which were thought to be trophic in character and which were usually in the form of dryness of the skin, or in the form of small pinhead-sized vesicles, which tended to coalesce and later to form bullæ. There was also more or less marked interference with the mobility of the various joints and of the spine.

In searching for the cause of these symptoms the *x*-ray demonstrated that the rheumatic pains, neuralgias, etc., were apparently caused by the presence of some sort of deposit on the articular surfaces of the vertebræ, which so encroached on the foraminæ giving exit to the nerves, particularly at the posterior portion, as to produce mechanical pressure on the nerves at their exit. The headache, constipation and indigestion seemed to be due to injury to the intestinal mucous membrane by the amebas. Microscopic examination of the feces constantly showed muscle-fibers, starch, vegetable cells and fibers, ammonium and magnesium phosphate crystals,

fatty acid crystals, oxalate of calcium crystals, cholesterin plates, mucus, pus, blood, blood pigment, soaps and fats, amebas, monads and frequently eggs of other parasites, as hookworm, roundworm, whipworm and, at times, the hyphæ and sporangiæ of molds. The trophic lesions were thought to be due to the mechanical pressure on the nerves, which had been so long continued as to interfere with their functions; the loss of motion in the spine and the joints to the pressure of the deposits, above mentioned, which could be seen in the *x*-ray plates. On examining my first pellagra patient, last November in Columbia, I was much struck by the resemblance pellagra had to the cases of amebiasis above mentioned. After reading all the literature on pellagra that I could, and from talking with Lavinder and others who had had experience with pellagra, the following working hypothesis was formulated, and the studies carried out in Columbia, S. C., were directed toward proving or disproving the various parts of the hypothesis.

WORKING HYPOTHESIS REGARDING THE NATURE OF THE DISEASE

The hypothesis is as follows: Pellagra is a disease resulting from an injury to the intestinal mucous membrane, produced by the ameba. As a result of the ulceration there is an inflammatory process extending throughout the alimentary tract which interferes with the absorptive power of the intestine and the manufacture of the digestive ferments normally produced in the intestines. Later, owing to long-continued inflammation in the intestine, the pancreas and liver undergo inflammatory change which interferes with the quality and quantity of the digestive juices that they produce, with the result that the food ingested is improperly digested. The presence in the intestine of undigested food favors fermentation and putrefaction of its elements, with the production of certain toxins, ptomains

and intermediate products of digestion which are harmful to the body.

As it has been shown by Herter that the *Bacillus aerogenes capsulatus* is present in the intestines of carnivora, and readily ferments proteid matter, it was decided to look for it as one of the possible causes of the fermentation. The fermentation of the carbohydrates could be accounted for by the colon bacillus.

The insanity of pellagra was assumed to be due to the severe and long-continued toxemia. The lesions on the hands, neck, feet, face and genitalia were assumed to be due to two factors: first, the mechanical pressure on the nerves at their exit from the spinal canal, and second, the degeneration of the nerves themselves as a result of the toxemia. The degeneration of the cord was assumed to be due to the long-continued mechanical pressure on the posterior roots of the spinal nerves, which would tend to have the same effect as section of the nerve.

It was assumed that the seasonal recurrence of the disease was due to the extremes of atmospheric temperature which exist during the socalled pellagra season, namely, March, April and May, and September, October and November. This assumption was not formulated until I had been in Columbia some time and had noted the changes myself.

INVESTIGATION OF HYPOTHESIS

An outline of the work done along the above lines will now be given: Examination of the stools of fifty-two of the patients showed amebas constantly present in the stools of fifty. In the two cases in which amebas were not found the stools were not satisfactory, in that they were not sufficiently liquid, and other specimens could not be obtained. Ulceration and damage to the intestine was shown, in all stools examined, by the presence of mucus, pus, blood pigment and blood.

That the liver and pancreas were damaged was shown at autopsy by the fact that both of these organs revealed cirrhotic changes, the pancreas especially being so hard as to be almost leathery in consistence; this was also evidenced by the presence of muscle fibers, vegetable cells and fibers, starch, soaps and fats in the stools. The latter observation, in addition to the fact that a damaged and ulcerated intestine cannot absorb as well as a normal one, might also be accepted as partial evidence as to faulty absorptive power on the part of the intestine.

Fermentation and putrefaction were shown by the presence of crystals in quantity in the stools, by the odor, by the fact that the stools were frequently fermenting and giving off bubbles of gas in the paper cups in which they were brought to the laboratory. The stools were invariably acid in reaction, frequently requiring as much as 5 to 10 c.c. of a 1/10 normal solution of sodium hydroxid to produce a reaction with phenolphthalein in 25 to 30 c.c. of stool. Van Noorden states in effect, in his work on "Metabolism and Nutrition," that acid fermentations, in that they withdraw bases from the blood to form compounds with the acids produced, diminish the alkalinity of the blood, and produce serious results.

The *Bacillus aerogenes capsulatus* was found in one case, according to the method of Welch, by injecting fecal matter into the ear vein of a rabbit, after a few minutes killing the rabbit, and allowing it to remain on the top of the incubator till the following day, when it was seen that the body was swollen with an inflammable gas, the organs were much decomposed, and the tissues generally were edematous.

In one case which had been under treatment until the stool was neutral in reaction, and in which crystals and the other signs of fermentation and putrefaction could not be found, the *Bacillus aerogenes capsulatus* could not be recovered. On account of the limited time and the difficulty of obtaining animals more experiments of this kind could not be made.

As regards the cause of the insanity, nothing definite was worked out, but it was noted that sudden changes in the atmospheric temperature made the cases much more toxic, and whereas the patients may have been fairly sane, they would become excited and would frequently have to be placed under restraint. This applied not only to the pellagrins, but to other patients in the asylum as well. This I cannot satisfactorily explain, unless it be due to the alternating warming and chilling of the surface of the body, causing the blood to leave the surface capillaries and producing an engorgement of the vessels of the intestines, and by so doing increasing the activity of the processes at work therein.

As to the lesions on various parts of the body, in every case of pellagra in which radiographs were made the plates showed deposits in the spinal foraminæ which apparently produced pressure on the nerves. As to the part played by toxic degeneration of the nerves themselves, I can only repeat what I was told by Dr. Achuccaro of the Government Hospital for the Insane, Washington, D. C., that experiments show that when various tissues, such as nerve, muscle and fat, are allowed to decompose, the nerve, being the most highly specialized of all the tissues, shows evidences of degeneration first.

It is possible that several factors may be concerned in the seasonal recurrence of the disease: First, renewed activity and new infections with amebas in the spring of the year; second, engorgement of the intestines due to chilling of the body surface; third, the growth of molds in food products, with resulting changes in these products, which could favor fermentation in a person already debilitated.

As to the degeneration of the posterolateral columns of the spinal cord, Marie made the observation that the degeneration began in the posterior roots of the spinal nerves; the radiographs show that the pressure does

come on the posterior roots of these nerves, at about the site of the ganglion. Further, at the only autopsy I could obtain, it was noticed that the foramina were so filled with what seemed to be a firm cartilage-like deposit that the nerves were wedged therein, and a large-sized sewing-needle or a Japanese toothpick could not be pushed through the foramina. The spinal canal was also partially filled.

In Gray's "Anatomy" the following statements are made:

> **The roots of the cervical nerves increase in size from the first to the fifth and then remain the same size to the eighth. The posterior bear a proportion to the anterior as 3 to 1, which is much greater than in any other region.**

It may be seen from the skeleton and the radiographs that the foramina in the cervical region decrease in size from above downwards, whereas as above stated, the nerves increase. These facts would seem to account for the lesions on the hands (fifth, sixth, seventh, eighth cervical and first dorsal), face and neck (third and fourth cervical).

With reference to the dorsal nerves Gray says, "The roots of the dorsal nerves are of small size, and vary but slightly from the second to the last." Examination of the skeleton shows these foramina to be larger than the lower cervical, and therefore there are no lesions on the parts innervated by the dorsal nerves.

The lesions on the legs and feet are due to pressure on the first and second sacral nerves, of which Gray says, "The roots of the upper sacral nerves are the largest of all the spinal nerves; while those of the lowest sacral and coccygeal nerves are the smallest." The foramina are larger than the other intervertebral foramina but are more tortous, and as the spinal canal in the sacrum is incomplete posteriorly and flattened, it is possible that any deposit here will produce pressure symptoms as in the other vertebræ.

TREATMENT

The amebiasis was treated by enemas of quinin bisulphate in normal salt solution. After a preliminary purge, the patient was put on a diet of milk, toast, rice and starchy foods. To aid the pancreas, pancreatin was administered in capsules coated with phenylsalicylate, in order that the hydrochloric acid of the stomach could not act on and destroy the pancreatin. To assist the pancreatin and neutralize the acidity present in the intestine, sodium bicarbonate was given, also in capsules coated with phenylsalicylate. To prevent accumulations of food and resulting fermentations, small doses of salts were given often enough to cause one or two bowel movements per day, not counting the results of the enema as a movement. The deposits were treated by inunctions of mercury and the internal administration of iodid of potassium, both pushed to the therapeutic limit. Rest in bed was ordered till the acute symptoms had subsided.

In all, twenty-five patients were treated, with the following results: Three died; of these, two died of chronic amebic dysentery, the pellagra lesions having practically disappeared; the other, just prior to death, was having from eighteen to twenty stools per day, and the pellagra lesions had improved, until the week before death, when secondary infections began in the lesions, and they became purulent. Twelve patients improved in varying degrees, both mentally and physically. Since these were insane negroes and no cooperation could be received from the patients themselves, it was surprising that they improved at all. Six others also were improved, the last time I saw them, and, in accordance with information just received, they are continuing to improve. Four recovered, and all symptoms of pellagra had disappeared, except a slight increase in the patellar reflexes.

While many of the studies seem more or less suggestive, and while the percentage of improved and recovered

seems encouraging, I feel that, in accordance with accepted medical standards, no conclusions can be drawn as yet, and that much longer and more detailed studies will be needed to prove or disprove the value of the researches just outlined.

In conclusion, I wish to acknowledge my indebtedness to Dr. J. W. Babcock, of the State Asylum at Columbia, for his kindnesses, assistance and many courtesies. I also wish to thank Dr. R. W. Gibbes, of Columbia, for the excellent radiographs he has taken, and the members of the asylum staff and the physicians of Columbia for permission to study their cases.

Since completing my studies in Columbia, I have seen nine positive and sixteen suspicious cases in the Philadelphia Hospital for the Insane. Of twelve specimens of stools examined from these cases, all showed amebas.

THE FARM; THE NEXT POINT OF ATTACK IN SANITARY PROGRESS

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The careful student of sanitary progress in the United States to-day is early impressed with the great contrast between the sanitary conditions in country districts and those in the cities. Recent years have witnessed great progress in the cities. Effective health departments have been organized, and the effect of measures such as the supervision of water and milk-supplies, the visiting nurse and the tuberculosis dispensary, medical inspection of schools and the accurate control of contagious diseases has been so pronounced as to place their work on a firm basis, and to insure its continuance and extension. While much remains to be done in the cities, the foundation has been laid and the methods of work more or less standardized. It is not too much to say that we are within sight of the solution of many of the problems of municipal sanitation.

While these facts are true of the cities, in those states with which we are familiar no such condition exists in the country districts. They remain as they have been for years, without efficient organization, depending on the methods and beliefs of thirty years ago. In only a few states is there adequate supervision of the rural communities; only a few states require the reporting of even the most dangerous of contagious diseases, and in most cases what activity there is in the country districts is confined to the control of smallpox, diphtheria

and scarlet fever, with occasional attention to a flagrant nuisance. The vast contributions of modern science to the prevention of disease are for the most part lost to the people of the country for the lack of organization and education. There are, of course, isolated exceptions to this statement, such for instance as the wonderful work of the Pennsylvania Department of Health in connection with tuberculosis in rural districts, but for the most part conditions are as stated.

The reasons for this contrast are, in the main, perfectly obvious. There is in the first place a greater survival of the individualistic idea of life in the country than in the city. Government touches the life of the individual in the country to a limited degree only. His personal liberty, so called, is seldom invaded. He is, and he considers himself to be, a law unto himself. In the city the communal idea prevails; no man lives unto himself alone; government is at the elbow of every citizen. In the second place, the very isolation of the country makes it almost impossible in the circumstances to educate the country people in the importance of health measures. A single successful campaign against measles or diptheria or impure milk will generally convince the people of the city of the importance of health measures. As such a campaign is difficult or impossible under present conditions in the country, education comes more slowly and the support of health measures is always more doubtful. In the third place, the contrast between country and city is largely due to the fact that health measures are more obviously necessary in the city than in the country. The crowded city demands health protection. Where our nearest neighbor lives half a mile away he may suffer from a wide variety of diseases and we may never feel the danger, but where we are separated from contagious disease only by the partition wall of an apartment house, we feel the necessity for and yield more readily to preventive measures.

The explanation for this contrast, however, is not its justification. The country, no less than the city, needs health education. The country, even more than the city, stands in need of fundamental health precautions. The very mass of disease in the country districts of itself requires that this problem be attacked, but the bearing of rural sanitation on the health of our cities is perhaps a still more immediate reason why our point of attack should be shifted. The health of the city depends in a large measure on the health of the country. Practically all the food-products of the city come from more or less remote country districts. A single case of typhoid fever on a dairy farm may, under certain conditions, infect a whole city, and emphasize to all the intimacy of the sanitary connection. In the same way, close intercourse between cities and the country renders the former particularly liable to infection from the latter. Our experience in Virginia, which is doubtless borne out by that of other states, has convinced us that the prevention of smallpox in the cities is very largely dependent on the close inspection of smallpox in the country, since most cases of this disease are brought into the cities from rural districts or small towns. Then, again, there is a crying need for better rural sanitation because of the more or less general residence of city people in the country during vacation time. We have found in Virginia that the country boarding-house is one of the great sources of our typhoid fever, and many of the cases which appear in the cities after vacation can be traced directly to the bad sanitation of country resorts. If, therefore, the health of the cities is to be improved, the health of the country must also be bettered. And if the nation is ever to stamp out disease, it must be by a general attack in both the city and the country.

In addition to the crying need for such work rural conditions offer to the scientific sanitarian the attraction of almost unparalleled opportunities for research work in

the transmission of disease. In typhoid fever particularly, we in Virginia are firmly of opinion that the key to the eradication of our summer typhoid is to be found in the country. To trace the means of dissemination of typhoid bacilli in a city, with its manifold sources of food-supply, the complication of the milk-supply, with daily contact between thousands of persons any one of whom may be in the incubative stage of the disease or may be a typhoid carrier, and with the constant temptation to attribute the infection to the water-supply, is beset with so many difficulties as to make it almost hopeless. The best that can be done is to draw general conclusions from the study of large groups of cases, and even here it is difficult to exclude the general factors of flies, milk and water.

In the country, conditions are very different. Given a country district free from typhoid for several years, the first case is easily discovered, and the transmision of the disease may often be worked out with mathematical accuracy. Water and milk are, of course, easily excluded; flies may be considered with some accurate idea as to their importance as a factor in transmission; and the actual amount of contact resulting in infection may often be determined exactly. We have been able to do this in Virginia in a number of instances with results of the greatest interest. This work extended over a large area, and, combined with careful statistical studies will throw more light on the city problem than can be obtained in the city itself by any means known at present.

Nor is typhoid the only disease which can be advantageously studied in the country. We have found the study of the transmission of smallpox in rural districts to be of great interest by reason of the fact that the time, place and manner of contact can be worked out with ease and certainty. Diphtheria and scarlet fever, studied case by case in rural districts, should throw

great and much-needed light on the transmission of these diseases.

It may not be amiss at this point to call attention to the value of the case method of study of infectious diseases in rural work. A personal visit to each patient, the collection of the data needed at the place where the disease occurred, and the interpretation of the epidemiologic evidence in the light of the other information secured by a visit to the premises, offers by far the most promising method for the solution of the problems now pressing for solution.

The rural districts, however, offer even greater possibilities in practical prevention than as a field for studies in the transmission of disease. The separation of individual cases, the slowness and freedom from complication of the intercommunication, render health work in the country much easier than in cities. With trained men, and an adequate system for promptly collecting and studying morbidity statistics, preventive work in rural districts may be made to have the efficiency of a well-oiled machine.

Even here, however, it is obvious that all the phases of sanitation which arise in the study of rural conditions cannot be studied fully by the limited force at the disposal of the average state health department. Some limitations must be made and some problems in the country must receive more attention than others. In Virginia we have carefully considered the subject and have concluded that, for the present at least, typhoid fever and hookworm diseases should receive first attention. The reason for this decision will, I think, be obvious to all. Typhoid fever is and will probably remain the greatest single problem of rural hygiene. High as is the death-rate from typhoid fever in the country as a whole, it is highest in the South; and awful as is the toll which most Southern cities pay to this disease, their burden is not so heavy as that of the rural sections of the same territory. Hookworm has been placed beside typhoid fever in this

work because we are convinced that hookworm plays a part hardly less important than that of typhoid fever in the South and is essentially a disease of the country.

If we must study rural hygiene for its own importance, and if we must limit our study for the present at least to these diseases which are the most disastrous, we must begin our study on the farm. We should not, of course, omit the small towns, as they offer problems intermediate between those of the city and those of the country. But a study of these towns convinces us that in the main the dangers are essentially those of the farm, and the problem is practically the same in its fundamental aspect as that to be encountered in the country.

The farm is the point of attack, and in the work against the diseases I have mentioned the farm is the unit both in the spread and prevention of infection. Each farm is, to all intents and purposes, a separate community, with its own population, its own problems of sanitation, and its own forces for good and evil. The work we would do for the improvement of rural conditions of sanitation must be done for the improvement of the farm.

Studies of sanitary conditions on farms, such as those of Stiles, show facts that are almost unbelievable in the light of our knowledge regarding soil pollution. These studies have been confirmed by our work in Virginia. We have inspected in the course of our work against typhoid and hookworm diseases thousands of farms, and it is the exception rather than the rule that we find even the most primitive sanitary arrangements in use by the people. The privy, if existing at all, is old, in bad repair and of antiquated design. Its use is confined almost exclusively to the female members of the family, the males relying on still more primitive methods of disposal. The contents are open to the chickens, the hogs, the dogs and the flies, and these agencies are relied on to take care of the small amount of material actually deposited in them.

Water-supplies follow the same general tenor, the wells being usually carelessly dug, carelessly protected, if protected at all, and carelessly kept. The well tops, almost without exception, show wide cracks through which filth is washed at all times into the well; the buckets are handled by all kinds of hands and then carefully lowered into the well for the only cleaning they ever get. The personal habits of the average inhabitant of a rural district are of a character in keeping with the other sanitary conditions. The absence of running water, and particularly hot water, make effectual cleanliness, especially in cold weather, difficult, and the amount of water used per capita per day is exceedingly small.

It must, of course, be admitted that in every rural community there are those of sufficient intelligence, self-respect, and ability to rise above these conditions and to provide themselves with modern sanitary conveniences, but, particularly in regions where the economic standard of rural life is low, these exceptions are few, and for the most part conditions are as I have described them.

Even under these conditions, amazing as it may seem, there are many rural communities which are and have been for many years practically free from typhoid, despite the prevalence of the disease in this country. There are others in which hookworm has apparently never gained a foothold, but the introduction of a single case of typhoid under favorable conditions is sufficient to give rise to a wide-spread outbreak of the disease, and hookworm infection, though slower in its spread, is equally certain to infect the entire community under these conditions.

These conditions, then, fix the problem of the farm, if they do not solve it, and indicate the direction our work must take. The building of a proper privy with its habitual use by every member of the farm community, its regular and frequent cleaning and proper disposal of the material, the safeguarding of the water-supply, and the instruction of the people as to the necessity of obey-

ing the Scriptural injunction to wash before meat, are not of themselves difficult, expensive or revolutionary procedures. Moreover, when we take into account the fact that the carrying out of these procedures will do much to secure the immunity of the inhabitants of the farm from soil-pollution disease, it does not seem that it would be difficult to secure their adoption. When we face the problem in Virginia, however, of putting these measures into effect on hundreds of thousands of farms, scattered over forty thousand square miles of territory, and containing a population of one and a half million, who live under a governmental system which promotes the idea of individualism and individual rights, the question does not seem so simple.

The problem must, of course, be attacked in detail, county by county, district by district, farm by farm and individual by individual.

It has seemed to us that in attempting to solve this problem in the State of Virginia we could well take a leaf from the book of modern industrial enterprise; that the methods which have been worked out by the marvelous organizations of commercial interests might well be of use in a work of this kind. The problem of a man who would teach the people proper sanitation is not essentially different from the problem of the man who would sell them a book, or a safety razor, or induce them to buy an improved churn. The proposition is a selling proposition, and our forces may well be modeled on the sales force of any modern industrial enterprise.

The first question is that of advertising, or, as we are accustomed to speak of it, of education. At the outset it should be insisted on that such health education or advertisement should be an education regarding the fundamental principles and established facts and not regarding individuals or experimental ideas. In our advertising campaign to reach the farmers we must suppress all personal references and make our advertising carry sound

and proved facts of sanitation. We must advertise our product and not our sales-manager.

The forms of publicity to be used in this educational campaign are varied, and practically all of them are to-day being used in common by commercial and health organizations. Press notices, which are easily secured at small cost by a proper press-agent, are of enormous value; special stories are gladly carried by newspapers if they do not carry too much self-advertisement; bill-boards, magazine stories and articles, and special publications of various health departments are being used daily in this work. In addition, lectures, exhibits, special railroad exhibit cars, demonstrations in railway stations and public places, all have their place and all are being used by public health agencies.

But these are not of themselves sufficient. They arouse the interest or excite the curiosity of those whom we wish to reach, but they do not give the individual the necessary impulse for immediate action. We must have something more personal, more direct and impelling to obtain the results that are necessary. Here again the analogy with selling forces of commercial concerns becomes striking.

We must have a detailed field force. We must have a force which will personally reach every farm whose sanitary condition we would improve. While all local health organizations have this end in view, and the individual physician constitutes a powerful force, even these must be aroused to their opportunities, must be educated and stimulated as much as our lay constituency. They correspond, in the analogy we have drawn, to the trade for the regular distribution of our product. We have not created the need for the product until our detail man has visited the consumer.

The effort to meet the need for detail work, especially in connection with hookworm in Virginia, has resulted in the appointment of what we call the rural district inspectors. Each rural district inspector is assigned to

an area of four or five counties, conveniently located and accessible from some one point as headquarters. This district inspector is the detail man in our selling campaign. He goes into the district and visits first the physician, taking with him his microscope, his literature and a small amount of properly prepared medicine. He is a graduate physician, qualified to practice medicine, but his whole time is devoted to the work and he is allowed to accept no fees. On his visits to the individual physician he interests him in the hookworm disease, diagnoses a few cases for him, and treats several in order to be sure that the physician is thoroughly acquainted with the practical details of the work he is going to be called on to do. Then, with the cooperation of the physician, working in the practice of one physician at a time, he visits the individual farm, talks with the head of the family, or better still, with the mother, points out the children who are probably infected, gets specimens, leaves literature, suggests treatment and refers them to the family physician. In this way, within a comparatively short time, he has covered the territory of the physician with whom he is working, has secured a few object-lessons of treatment, has prepared the physician to take care of the cases when they come, and has started the current toward the physician. He also inspects schools, gives public lectures and demonstrations, and, in general, agitates the question until everyone in the community is thoroughly acquainted with the facts regarding the disease.

The detail work so far has been very successful. The patients who are treated recover so rapidly and exhibit such marked improvement as to constitute an unanswerable argument for the truth of the contentions of inspector and physician as to the importance of the disease.

The whole community rapidly becomes interested in the subject; the worst cases are soon treated, and the

mild cases come later; and with the spread of the truth regarding the prevalence of the disease and methods of its spread comes the desire for better sanitary conditions.

The amount of territory which can be covered by an active man in this way is very large, and, though we have not exactly determined it, we estimate that four or five badly infected counties can be cleaned up in a year's time, and that then the inspector may be moved to a fresh district. In this way four or five years should see Virginia thoroughly canvassed for hookworm disease, and the extirmination of the disease should be in the way of accomplishment.

The work in connection with hookworm will undoubtedly yield an extra result in typhoid fever equal in value to that from hookworm, and we believe that the successful carrying forward of the present campaign will result in a marked reduction in rural typhoid. In addition—and by no means least important—the demonstration of the practical benefits of systematic and scientific work in rural districts afforded by a successful campaign of this character will place preventive work on a new and firm basis before the country people, and should render the systematic and permanent extension of this work, embracing all diseases, easy of accomplishment.

We believe, therefore, in conclusion, that present rural sanitary conditions must not be allowed to continue; that the problem must be attacked in detail; that detail work will yield tremendous benefits both in contribution to our present knowledge regarding the transmission of many diseases and in the actual prevention of thousands of unnecessary cases of preventable diseases.

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ABSTRACT OF DISCUSSION

ON PAPERS OF DRS. LONG AND FREEMAN

DR. CHARLES W. STILES, Washington, D. C.: The center of the hookworm problem is, of course, the farm. I would like to touch on the next point geographically in the distribution of the disease, namely, the cotton-mill village, its sanitary

conditions and the proportion of distribution from that point.

It should be recalled that many of the mills send out to the farms and bring the families in to work in the mills. Many of these families have never used a privy before going to the mills. For these families, therefore, almost any thing in the shape of privy is to be viewed as a sanitary improvement in their surroundings. Many of the families not only are unaccustomed to a privy, but are opposed to it. I have seen families which actually had to be "housebroken" to the use of a privy. Such persons will even stool on the floor, rather than use an outhouse. I have seen the effects of this dislike, and, further, mill managers have repeatedly told me of the difficulties with which they have to contend in order to stop promiscuous defecation. I know of at least one cotton-mill which starts its families in certain houses on the outskirts of the mill village and doesn't move them into better-situated houses until after some few months, or a year or more, when the families have become less dirty in their habits. That these families will spread hookworm disease through promiscuous defecation is self-evident. It may, therefore, be taken for granted that some hookworm disease does actually spread in this way, in some of the mill villages of the South.

DR. MARSHALL LANGTON PRICE, Baltimore: Human sewage is a particularly dangerous class of waste material which like many other waste materials may be classified as a nuisance dangerous to public health if disposed of in a manner whereby it may give offense or danger. Like other nuisances it may be dealt with under the common law, either by civil suit or by injunction proceedings. Statutory remedies are not always superior to those afforded by the common law. It is well, therefore, to consider first what remedies the common law affords against the dangers of sewage disposal and especially of privies. Human sewage may under certain circumstances become a nuisance under the common law on two grounds: (1) offensive character; (2) danger to public health. Since the common law is not fixed, except by a few well-established precedents, but fluctuates with public opinion, knowledge and experience, and in particular with the interpretation placed on these various factors by the superior courts, it is important that these courts should declare the deposit of sewage on an exposed surface or its discharge into a stream of insufficient volume a nuisance *per se*. Decisions of this kind in regard to other far less dangerous nuisances have been made by various superior courts.

Thus the Maryland Court of Appeals decided in the case of Woodyear vs. Schaeffer—a suit on petition for an injunction—that the discharge of blood from a slaughter-house into a stream was *per se* a nuisance and as such to be enjoined.

Since remedy by common law is often clumsy, slow and inadequate, statutory regulation becomes necessary, and the question then arises of the best method of statutory control of sewage disposal. Certain general powers are granted to all sanitary departments of the government under which the question of sewage disposal could be reached but the problem is so very important that specific statutes should be everywhere enacted and enforced. It would appear proper and logical to leave the enforcement of these statutes to local sanitary governments, subject to regulation by the central authority.

In Maryland I introduced into a local sanitary law the first specific provision relative to sewage disposal in effect in that state. The provision authorized the county commissioners to pass rules and regulations to govern the disposal of urinary and fecal matter within the county. The county commissioners have not yet passed regulations under the act, but after we have studied the problem carefully in the state and the necessity can be shown, they undoubtedly will adopt such regulations under proper advice. It appears, considering the weakness of local sanitary government in many states, that the best way to deal with this problem is to allow local authorities the power of adopting rules and regulations governing sewage disposal and make them subject to revision by the central authority. We are also very much in need in all of our states of a method of procedure like the local government board in England. Where the sanitary authorities are weak, state authorities should have and should exercise the power of superseding the local sanitary government and carrying out, themselves, the necessary measures of intervention.

DR. JOHN L. JELKS, Memphis, Tenn.: Dr. Stiles visited my city not long since and saw a case of amebiasis, in which he suspected hookworm. I found myiasis, which induced me to prepare another paper on dysentery, the title of which was "Have You Dysentery? Bell Your Flies." In my chapter on dysentery in Hirschman's book, and in previous papers, I have referred for several years to the crime of polluting gardens and truck-farms with excreta. In a paper read before the Tennessee State Society in April, I reported cases of skin lesions associated with amebiasis, and then presented before that society a case of pellagra in which I found the *Entamœba histolytica;* I presented an opinion that there probably was an etiologic relationship between pellagra and this and other parasitic intestinal infections, such as amebiasis and uncinariasis.

For two years I have been alluding to certain skin manifestations or complications of amebiasis. I have made about

one thousand examinations, microscopic and proctoscopic, during the last ten or twelve years. In this period I have found only three hookworm cases. I have observed during this same period about five hundred amebic cases. All of these but three were among white people; most of them were in males. I have observed one case of myiasis; I have observed two cases of pellagra. In one of these pellagrins I was permitted to make microscopic and proctoscopic examination, and I found the *Entamœba histolytica*, the other has not permitted proctoscopic and microscopic examination. Professor Audre refers to skin manifestations of muco-membranous colitis. I reported six cases yesterday, and previously, last year, reported three cases. Professor Audre's cases, I judge from his own description, were amebic. I have observed associations between pellagra and parasitic infections (hookworm and ameba), and I have seen skin lesions in a number of chronic amebic cases. Bass finds good evidence that pellagra is of protozoan origin, in that the Wassermann test is positive.

If preventive medicine is worthy of our nation's effort, if prevention of hookworm is worthy a philanthropist's million, may we in the delta and alluvial districts not share his and the nation's magnanimity in preventing a more serious and prevalent infection in the alluvial valley of the Mississippi?

Dr. C. C. Bass, New Orleans: I don't want the idea and theory advanced by Dr. Long's paper to go unchallenged and unquestioned. I believe that, answering the question of amebiasis it is only necessary to call on those who have examined large numbers of specimens, and large numbers of patients, for amebas. We should remember that the *Amœbæ coli* are non-pathogenic, do not damage the intestinal canal at all, and that they are far more numerous, and the dysentery amebas are far less numerous. In institutions the water-supplies of which becomes infected with amebas, especially with *Amœba coli*, the majority of the patients are likely to be infected. Unless we examine at the same time a corresponding number, or a much larger number, or other individuals in the same institution or from the same source, the presence of amebas in the stools of pellagra patients in such institutions would not throw much light on the possible etiologic relation of amebiasis to pellagra.

With reference to the presence of hyperacidity of the feces noted by Dr. Long, we must remember that in the presence of any lowered condition of vitality, such a condition as obtains for days, weeks and months before patients die of pellagra and actually has already obtained by the time the patients show any symptoms by which we can diagnose the disease, their vitality, their resistance to intestinal infection, bacterial or protozoan is very much lowered. This would increase the acidity due to bacterial growth.

We must remember also that one factor appears certain as a cause of pellagra, though there are more than one, probably several causative factors. I believe I can show, with some pictures I have, that exposure to sunlight is absolutely one of the factors in the production of the skin symptoms of pellagra. The skin lesions are usually minor and terminal symptoms of pellagra are seldom the important early symptoms of the disease.

In one instance an insane woman had a peculiar habit of keeping one hand in her bosom all the time, while the other one was exposed to the sunlight. The exposed hand developed pellagrous lesions; the other remained absolutely free. In another instance a woman wore a finger-ring on one finger on each hand. A short time after she had developed the disease she pulled the ring off from one finger and continued to expose herself to the sunlight for the benefit of her health, taking buggy rides in the sun. She continued to wear the other ring, until she was sick with a well-developed attack of pellagra. When first seen by me she had a perfectly clear, normal skin under the ring; the remainder of the hand presented a severe form of pellagrous skin lesion.

Dr. James W. Babcock, Columbia, S. C.: I think that we are all under a debt of much obligation to Dr. Long for his paper, and particularly for emphasizing once more the importance of the presence of amebiasis in pellagra, and furthermore for the observation of the deposit within the spinal foramina, thus giving another theory to explain the presence of the skin lesions.

I think most of us who have studied pellagra for any length of time are beginning to realize that we are dealing with a big problem. The trouble is that each one of us approaches the subject from too narrow a viewpoint. The dermatologist sees in the condition purely a dermatologic condition; the asylum man sees in it insanity, and so on; and each one approaches this big subject in too narrow a way. The observation of parasites in pellagra is an old one, established long ago in almost all the cases that were admitted to the Cairo (Egypt) asylum. Allen, of Charlotte, N. C., last fall demonstrated the almost constant association of amebiasis with cases of pellagra in his section of the country.

I have an associate who sees in pellagra merely an expression of the hookworm disease; and the positive denial by Dr. Stiles that he had ever seen this expression of the hookworm disease does not satisfy this friend of mine at all; it is probable that pellagra and ankylostomiasis will to him always be synonymous. Reference has been made to Dr. Bass' observation of the Wassermann reaction in pellagra. In connection therewith, I think it should not be forgotten that Dr. Howard Fox of New York has studied 30 cases of pellagra with the

Noguchi modification and failed to establish the presence of the Wassermann reaction, so we have two observations—one pointing to the presence of a parasite and the other denying it.

Sir Patrick Manson mentions the presence of intestinal parasites in a condition similar to pellagra and warns observers not to associate these conditions as of cause and effect. Manson in the fourth edition of his "Tropical Diseases" says: "The novice in tropical medicine will be greatly puzzled over these cases of beriberi. If he examines the blood of these patients; possibly in a proportion of them he will find *Filaria nocturna* or some other blood worm. Very likely he will then think that the cases are forms of filariasis, and he may construct theories to explain how the filaria produces the symptoms. In some countries, in nearly all cases, he will find the ova of the *Ankylostomum duodenale*. On this evidence he may conclude that these are cases of ankylostomiasis. He had better, however, not commit himself to such a diagnosis until he has ascertained how it fares with the rest of the population as regards these parasites, for he will find that the ankylostomum and the filaria are quite as prevalent outside as inside the hospital and in the healthy as well as in the sick."

It is very important in the treatment of pellagra to remove these various parasites, but I think we shall find out in the end that the removal of the parasites does not *per se* cure the pellagra.

DR. SENECA EGBERT, Philadelphia: I would like to emphasize the point Dr. Price has cited about the matter of control. From our experience in Pennsylvania I believe it will pay any of the commonwealths in the south, or anywhere else for that matter, to have enacted a very strict and comprehensive health law, and then, if they can, get a commissioner that has nerve enough to enforce the act wisely and conscientiously, appointing under him county and other local health inspectors. I was very much interested in Dr. Freeman's talk on the work of the county or the farm inspector, for that seems to me an admirable way of carrying out what I was talking about this morning—the matter of popular education—and also to attain our object of improving public health.

We in Philadelphia are interested in this matter of pellagra because, I am told, we have had some cases of the disease in our city hospital, although I have not personally seen them. But you have typhoid fever in the south, as well, and if you can get rid of that at the same time that you are getting rid of your hookworm and your pellagra your gain will be so much the greater.

It seems to me that with the kind of work that is being done by the City of Richmond, and by Virginia, in sending out live, intelligent, up-to-date men who go out into the rural

districts and show the people about these diseases and also show them how to rely on the talk of the local doctor, we have the popular education which is needed as a basis; and then with a proper set of health tracts for general distribution and with increasing work, it seems to me your problem down there in regard to the hookworm, pellagra and all of these troubles—typhoid not the least of them—is going to be, not easy of solution, but capable of solution within a shorter time than you or we, perhaps, anticipate.

DR. JOHN D. LONG, Washington, D. C.: My paper may sound misleading as to my intent. The work is somewhat different from any work that has been done in pellagra before, and for that reason I wish to say that I do not mean to pretend or assume in any manner that the pellagra question is solved. I am simply giving the hypothesis on which I worked in Columbia and an outline of the studies that were carried out in accordance with a working hypothesis.

DR. CHARLES W. STILES, Washington, D. C.: I believe in a license system for the privy. Certain of the southern towns (Chapel Hill and Richmond) at present charge householders about $5 per year license for every privy. The town then furnishes the disinfectant and pails and does the cleaning, the expense for which is covered by the license fees. It seems to me that that is a very excellent system. We must come to the point of view that the privy, despite the fact that "privy" refers to "private"—is not a private institution but a public institution. I believe also in the compulsory privy law which is being introduced in certain southern localities; but there is one factor in the south which we must not overlook, and that is that after we have the sanitary privy introduced we have an element in the male negro population which is going to be difficult to control. The white women now are using the privies when they are present; it will not be a difficult proposition to get the white men to use them; many of the negro women are using them; but it is going to be a very difficult task to teach the negro man to use them. I do not personally believe that there is any way to do this except by compulsion. Eventually we shall have to come to the standpoint in the southern states that an insanitary act means a service on the chain-gang; and eventually, I think, the chain-gang will be the school of cleanliness for the male negro.

DR. ALLEN W. FREEMAN, Richmond, Va.: We have solved an exceedingly distressing condition in Richmond, Va., as regards the privies. We had three years ago some 5,000 open privies, a great many of which were never cleaned at all; they were mostly in territory which had only recently been annexed to the city. Dr. Levy, the health officer, with his customary energy, had an ordinance passed requiring every privy

in the city to be rebuilt in accordance with standard specifications which were drawn up and printed. Within six months some 5,000 privies were built or remodeled. They are cleaned regularly by a city officer. The cost of cleaning is a charge on the property and is collected just like any other tax. I am glad to say that the reduction in typhoid following this procedure was immediate. This reduction did not follow an enormous amount of work on the milk-supply, on other foods and on the individual cases to secure the disinfection of infectious material at the bedside. The typhoid death-rate, which had never been below 44 per hundred thousand per annum, dropped last year to 24; and we hope to see it go still lower.

CERTAIN LEGAL ASPECTS OF DOMESTIC QUARANTINE

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The word "quarantine" was originally used to designate the forty days of Lent. Then it was applied in the English law to the forty days after the death of her husband, during which a widow had the privilege of remaining in her husband's mansion house, and during which time her dower was to be assigned. Next we find the term employed with reference to the forty days during which a vessel might be detained without intercourse with the shore, after arrival from an infected port. After it was learned that forty days' isolation was not invariably necessary, the original signification was dropped, and the word came to refer only to the isolation of the vessel. The same idea, and the same methods, applied to protection at a land frontier; and later to the isolation of persons, or places contaminated with infectious disease. It is interesting here to note that syphilis was a subject of land quarantine in Europe during the earlier years.

The present domestic quarantine is no more anomalous as to original signification, than it is as to either law or science. We know well that in the case of yellow fever, for example, it is far less necessary to prevent intercourse between the patient and healthy individuals, than it is to exterminate the stegomyia mosquitoes. A typhoid patient is not properly isolated if his discharges are thrown into the public sewage system before disinfection. The complete disinfection of those discharges

must be an integral part of such quarantine, yet that fact is not generally realized by the citizens of this country. As to the legal side, we have made practically no advance in the last hundred years. Neither the rights nor restrictions of either state or individual, are much more clearly recognized to-day than they were when this nation was born. Just as in industrial pursuits, to preserve the same general line of action, we must alter our methods to conform to recent scientific advances, so in law we must alter our statutes and institutions, to conform to the decisions and discoveries of a progressive people. Fundamental law must be flexible, and change in form according to conditions. Is it not time that our archaic practice as to quarantine should be critically examined and revised?

The first step from absolute monarchy is the establishment of institutions. Institutions may be safeguarded by constitutions. Though ours is a constitutional government, there are certain institutions which have survived which are more dictatorial than constitutional, and quarantine is one of these. It overrides all constitutional rights. Though we are supposed to have guaranteed to us the right of liberty, any person may be imprisoned by a health department, without a previous trial, and without even having a formal complaint lodged against him. Is a retail merchant a criminal simply because a patient suffering with a mild form of smallpox happens to come into his store to make a purchase? Yet such a dealer may have his store closed, and be himself imprisoned, and he is practically without redress.

It is well recognized that the greatest liberty for the individual, as well as the greatest safety for the nation, is to be found in the observation of constitutional provisions. Whenever two courses are open it is our duty therefore to take the constitutional route. It is sometimes necessary, however, to suspend constitutional protection. Thus when the spirit of anarchy settles on

a community, and a mob rules a city, the slower operations of ordinary law are unable to cope with the danger, and martial law must be declared. So too, a man's house is his castle, and the stranger may not enter without permission; neither must he take therefrom aught which is not his own: but when the house catches fire, no portion is so private that those who are fighting the fire are restrained thereby. It is contrary to both constitutional and statutory law to kill a human being: but "self-preservation is the first law of nature," and it is not deemed criminal if the killing be in self-defense, or, as in the case of a policeman in the line of duty. Self-preservation on the part of the community may demand the imprisonment, either at home or elsewhere, of an individual afflicted with, or exposed to, an infectious disease. If the ordinary liabilities were more clearly defined in the statutes, and the duties of health officials were thus definitely prescribed, much possible opposition would thus be removed, and even in those occasional extraordinary emergencies when it is necessary for the health officer to take martial command, he would have more of the confidence of the citizens, and more active support. The present system is unconstitutional, un-American and despotic in many states. Whether the powers are used for good or bad, whether as a help to the community, or a means of oppression, depends entirely on the individual officer. It is true that the power is seldom abused, but we must remember the possibility. During the old Tweed régime in New York City we are told that the health department was systematically used as a tool for collecting blackmail.[1]

There is another form of abuse of sanitary authority which is more or less common. It forms an argument against boards of health, as compared with health commissioners; and it is an evidence that health officials should not be engaged in private practice. Here is an

1. Autobiography of Andrew D. White.

illustration: A widow in Clark County, Illinois, sold milk in a neighboring village. Her son came home from Brazil, Indiana, sick with typhoid fever. The mother nursed him, still continuing in the milk business. The local board of health consisted of three physicians, unpaid. One of these was the attendant on the typhoid patient. Knowing that the widow was dependent on her business for support, he was reluctant about forbidding her to sell the milk. The other members of the board hesitated to act, lest their motives might be misunderstood, and jealousy charged. After some thirty cases of typhoid had occurred on her route, the sale of milk was stopped, and no further cases occurred.

It is true that we have at present a check on the abuse of the power now possessed by health officials, in the form of court supervision, but that check may very easily prove a source of annoyance, or oppression on the health departments, and the ends for which they are created be thereby defeated. For example: Suppose that the members of a household are quarantined for malaria. Every sanitarian knows that in the presence of the anopheles such a family is a source of danger to the community, and the individuals should be restricted as to liberty. It would not be difficult, however, in most communities to find physicians who have the respect and confidence of the citizens, and who would deny in court the relationship of mosquitoes to the disease, and who would assert that malaria is not infectious like yellow fever, but that it is due to some indefinite miasm which is present in certain localities. Under such conditions it would not be strange if a judge should decide that the disease is not infectious, and he might even render a judgment for damages against the health officer. In the absence of statutory provisions to the contrary, the opinion of one physician is as good in law as that of another, and a health officer is only a physician under such conditions.

The three great objects of government are: The maintenance of national existence; the maintenance of right or justice; and the public welfare.[2] Health departments have to do with each of these objects. Their powers are of the nature technically called police powers. While the Federal government may exercise certain of the functions of health administration in the United States, *authority* of action rests in the individual states. Certain powers may be delegated by the states to the municipalities. These delegated powers are always subordinate to state action. Thus, among the powers of cities and villages granted in the statutes of Illinois we find:[3] "Sixty-seventh.—To appoint a board of health, and prescribe its duties;" and "Seventy-eighth.—To do all acts, make all regulations, which may be necessary or expedient for the promotion of health, or the suppression of disease." Acting under these provisions the City of Chicago passed an ordinance making vaccination obligatory as a requisite for attending the public schools. The Supreme Court, however, in Jenkins *vs.* Board of Education,[4] held that the legislature of the state had not made such a requirement, and that it had not delegated the power to do so to the city.

In order more perfectly to control the collection of manure in the City of Chicago, an ordinance was passed and a contract made, after advertising for bids. One Landberg, who had made a business of collecting and selling such manure, was thereby thrown out of his occupation. He objected, and the Supreme Court found the ordinance unconstitutional, on the ground that it created a monopoly, and interfered with legitimate business. The city may regulate such occupation, by license or otherwise, but it may not, without specific power granted by the legislature, create monopoly, or destroy a private enterprise.[5]

2. Freund, The Police Power, Sec. 4.
3. Chapter 24, Art. V, and Section 62.
4. 234 Ill., 422.
5. Landberg vs. City of Chicago, 237 Ill. 112.

McGehee[6] holds differently, saying: "The property interests in the noxious materials must be subordinated to the general good." He refers to California Reduction Co. *vs.* Sanitary Red. Works, 199 U. S., 306, and Gardner *vs.* Michigan, 199 U. S., 325.

In these cases the matter of monopoly was distinctly considered as well as the interference with private business. Both of these cases were mentioned in the brief of the attorneys in the Landberg case. Since these decisions were from the highest court in the land, it seems strange that in differing from the Federal court the Illinois court did not specially mention these decisions in its opinion. It is the contention of the Chicago Department of Health that the present method does injure the community, and that the method proposed in the ordinance was necessary to safeguard the interests of the citizens.

The general rule governing such matters is thus stated by Freund.[7]

Under the principle of local self-government local authorities cannot be vested with powers necessarily exceeding their territorial jurisdiction; those matters therefore which equally affect the people of the state at large, and cannot be confined locally, must be reserved to the state legislature. Moreover, the inauguration of a novel policy in matters of safety and health, the prohibition of articles of consumption possibly but not undoubtedly injurious to health, the establishment of monopolies, the restriction of the right to pursue established avocations, may under circumstances be conceded to the legislature of the state, but cannot be introduced by local authorities under mere general grants of power.

Such a limitation of municipal power is reasonable. If left to the individual municipalities, confusion, and lack of protection is likely to arise, and local feeling may lead sometimes to excess of reasonable action. Thus adjoining municipalities may establish very different regulations as to quarantine. It is necessary, therefore, that there be a general supervision, and coordination.

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6. Due Process of Law, p. 336.
7. Police Power, Sec. 142.

In spite of the delegation of powers to cities and villages in Illinois, as cited above, we find that as amended in 1907 the Revised Statutes,[8] say of the State Board of Health that it "shall have supreme authority in matters of quarantine, and may declare and enforce quarantine when none exists, and may modify or relax quarantine when it has been established." Such a provision would be all right if it were made more definite, but there is nothing in the statutes making it requisite on any one to report infectious diseases to any one, specifying what diseases are to be quarantined, or defining in the least how, or to what degree such quarantine is to be exercised. It puts into the hands of the executive of the board almost unlimited power. Some time ago in a dairy district supplying Chicago with milk, families were quarantined for scarlet fever. A representative of the state board appeared and abolished the quarantine. If the law is constitutional, he had the undoubted legal right to do so autocratically. There was no appeal.

It is possible that such a law as that just mentioned might be declared by the court unconstitutional, for the reason that it gives to a man, or body of men, an arbitrary power, without limitation, and violates the provisions of the fifth and fourteenth amendments to the Federal Constitution. Health boards, and officers, have only executive power. They must not act in a legislative capacity. There is nothing in the statutes of the State of Illinois which limits quarantine of human beings to infectious, or contagious diseases. Though animals afflicted with contagious diseases are especially mentioned in the statutes, and provision is made against the spread of hog cholera, glanders, and cattle fever, so far as the state statutes are concerned human beings are permitted to communicate their diseases to others with impunity. On the other hand, there is nothing in the statutes which would prevent the state board of health,

8. Chapter 126a, Sec. 2.

through its executive officer, from quarantining a man afflicted with any disease, nephritis for example, though the common law practice might prevent such action. Still court action is not rapid, and a corrupt politician might thus gain the temporary seclusion of an opponent.

As set forth by Prof. Goodnow[9] there are three ways possible by which a nuisance may be determined; by the common law, by legislation, and perhaps by executive action when so authorized by legislative enactment. In common law, the courts are supreme, and boards of health have no power to enlarge common law nuisances. Smallpox is a common law nuisance, but malaria is not. As to the right of legislatures to enact such laws, there is no question. The restrictions on boards of health, or health officers, are not so generally recognized by sanitarians. In the most excellent decision of Pott *vs.* Breen,[10] the Supreme Court of Illinois said of the State Board of Health:

> It had and could have no legislative power. Its duties were purely ministerial, and the provision of the statute authorizing the board to make such rules and regulations as it should from time to time deem necessary for the preservation or improvement of public health cannot be held to confer that broad discretionary power contended for.

And:

> We are of the opinion that the powers of the board are limited to the proper enforcement of the statutes, or provisions thereof, having reference to emergencies requiring action on the part of the agencies of government to preserve the public health and prevent the spread of contagious or infectious diseases.

And again:

> Its duty to recommend legislation is repeated more than once in the act in connection with specifications of the powers and duties of the board.

The Supreme Court of Wisconsin gave a similar opinion in State *vs.* Burge.[11]

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9. Columbia Law Review, II, 203.
10. 167 Ill., 67.
11. 70 N. W. Rep. 347.

The Minnesota Supreme Court, in State *vs.* Young,[12] said:

> It is a principle not questioned that, except where authorized by the constitution as in respect to municipalities, the legislature cannot delegate legislative power—cannot confer on any body or person the power to determine what shall be law. The legislature only must determine this.

So we find in Dowling *vs.* Insurance Company[13] that it was an unconstitutional act when the legislature attempted to leave to the insurance commissioner the decision as to what form of a policy must be used. So too in Schaezlein *vs.* Cabaniss[14] it was illegal to leave to an executive officer the power to determine the particular form of appliance which should be used in factories to limit the dangers therein, and making it compulsory on the owners to comply with his orders.

Freund summarizes:[15]

> It cannot be left to an administrative officer to determine conclusively the existence of a danger, and the choice of measures to be taken against it, since that would involve an unconstitutional delegation of legislative power.

The fifth amendment to the Federal Constitution provides that no person shall "be deprived of life, liberty, or property, without due process of law; nor shall private property be taken for public use, without just compensation." The fourteenth amendment says in Section 1: "No state shall make or enforce any law which shall abridge the privileges or immunities of citizens of the United States; nor shall any state deprive any person of life, liberty, or property, without due process of law."

What is "due process of law?" Pomeroy says:[16]

> Due process of law implies primarily that regular course of judicial proceeding to which our fathers were accustomed at the time the Constitution was framed; and, secondly, and in a subordinate degree those more summary measures which are

12. 29 Minn. 551.
13. 92 Wis. 63.
14. 135 Cal. 466.
15. Police Power, Sec. 34.
16. Constitutional Law, Sec. 246.

not strictly judicial but which had long been known in the English law and which were in familiar use when the Constitution was adopted. These summary measures generally, though not universally, form a part of that mass of regulations which many writers term "Police," and which relate to the preservation of public quiet, good order, health, and the like. . . . The summary measures which may form a part of due process of law are those which have been admitted from the very necessities of the case to protect society by abating nuisances, preserving health, warding off imminent danger, and the like, when the slower and more formal proceedings of the courts would be ineffectual.

In Murray's Lessee *vs.* The Hoboken Land Company,[17] Mr. Justice Curtis says:

Though due process of law generally implies and includes actor, reus, judex, regular allegations, opportunity to answer, and a trial according to some settled judicial proceedings, yet this is not universally true. There may be, and we have seen that there are, cases under the law of England after Magna Charta, and as brought to this country and acted on here, in which process in its nature final, issues against the body, lands and goods of certain public officers without any such trial.

Due process is not necessarily judicial process.[18] The term, therefore, is now frequently applied to legislation. the underlying principles being that all persons interested may have an opportunity of being heard, and that the legislation does not represent arbitrary acts of government.[19]

An arbitrary statute is not due process.

The just cause of legislation is the legitimate function of government. A statute not supported by such cause is not due process.[20]

Practically the present system of judicial control over legislation has meant in many cases that unless all three departments of government are convinced of the justice and reasonableness of a radical change in social or economic policy it canont become embodied in principles of law.[21]

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17. 18 Howard 272.
18. Reetz vs. Michigan, 188 U. S., 507.
19. Johnson, J., in Bank of Columbia *vs.* Okley, 4 Wheaton, 235; also People *vs.* Smith, 21 New York 595, and People *vs.* Adirondack R. Co. 160 New York 225, affirmed in 176 U. S. 335.
20. Freund: Police Power, Sec. 20.
21. Freund: Police Power, Sec. 21.

A recognition of these principles, in the place of restricting the liberty of action for health officials, really increases their power. A man walking on uncertain ground must go carefully. When assured of its safty, he may step boldly and with speed. If the infectious nature of a disease is not legally established, no matter how sure the official may be, he is liable to be blocked by *habeas corpus* proceedings. He must then establish before the court the correctness of his diagnosis, the infectious nature of the malady, and that the measures taken are both reasonable and necessary. If he fails to satisfy the court on every point, the case is lost.

General rules and regulations have not the same standing as statutes.[22]

Such rules and regulations should only be issued in conformity with the clear and evident intent of the statutes. In Kirk *vs.* Wyman, *et al.*,[23] before the Supreme Court of South Carolina, we find this statement:

> **From this it follows that boards of health may not deprive any person of his property or his liberty unless the deprivation is made to appear, by due inquiry, to be reasonably necessary to the public health; and such inquiry must include notice to the person whose property or liberty is involved, and the opportunity to him to be heard, unless the emergency appears to be so great that such notice and hearing could be had only at the peril of public safety.**

In this case the court held that the health department exceeded its authority in removing a case of anesthetic leprosy to a pest-house. Sanitarians would agree that typhoid and malarial fevers are infectious, dangerous to the community, and legitimate objects for some form of quarantine. These facts have been recognized for some time. However, for a board of health, or a commissioner of health so to declare, or rule, would in fact be an act of legislation exceeding his authority. It would be giving neither due notice, nor opportunity to

22. Health Dept. *vs.* Knoll, 70 N. Y., 530, and also Reed *vs.* People, 1 Park Cr. 481.
23. S. E. R., 387.

be heard. The quarantine of such a case could hardly be justified on the ground of an emergency, for the general conditions have long been known, without any attempt on the part of the executive to secure proper legislation. The case of epidemic poliomyelitis might be different. The disease has generally been considered non-infectious, and therefore not a proper object for quarantine. The fact has only recently been demonstrated that it is infectious. The statutes should be sufficiently elastic in construction to permit health officials under such conditions to control and quarantine such a disease until such time as the legislature could reasonably be expected to act. If the health executive has placed the facts properly before the legislative body the responsibility rests on the law-makers, and the executive no longer has the right, in the absence of new facts, to declare such a disease quarantinable. So too, some well-known disease, which there seemed no reasonable probability would ever enter the particular community, might not have been mentioned in the statutes, and its appearance would constitute an emergency. In the case of Jenkins *vs.* Board of Education[24] it seems that the Commissioner of Health had issued orders declaring smallpox epidemic. The court held that he had exceeded his authority.

There is nothing in the nature of an emergency in the occasional recurrence of the well-known disease of smallpox in a city like Chicago, which may not be provided for by general rules and regulations prescribed by the legislative authority of the city.

It must be recognized that in all these litigations the health department runs the risk of defeat, and so of loss of prestige; and that even when the final decision is on the side of the health service, adverse decisions in the lower courts involve loss of time as well as expense.

The statutes of the states are generally silent on the authority of diagnosis, and in the cases which have come

24. 234 Ill., 427.

to court there is some difference of opinion. An infectious disease is a nuisance. In Kenedy *vs.* The Board of Health,[25] it was said:

The determination that a thing is a nuisance is final under the Pennsylvania statutes, and in a suit to collect expenses or abate the nuisance the defendants could not offer evidence to show that there was no nuisance.

In Brown *vs.* Purdy,[26] as to a question of the diagnosis by the health officer, it was held:

If there was any case for his judgment, or any fact or appearance or symptom as to which a question of smallpox or not could arise, his determination was final as to the legality or propriety of removal.

On the other hand, in Miller *vs.* Horton,[27] a board of health was held liable for the killing of a horse, at the order of the commissioner of contagious diseases of animals, who had decided that the horse had glanders. His diagnosis was disputed in court by unofficial testimony, and the court took on itself the responsibility of deciding that the horse did not have glanders. If the responsibility of diagnosis is not placed on the health officer, it must be remembered that the legal diagnosis must be made by the court, which is not supposed to have a medical education.

It will be noticed that in Brown *vs.* Purdy there is another question, namely, the authority of the health officer to remove a patient afflicted with an infectious disease. In Maine a police officer and the city physician, acting under the direction of the mayor of Bangor, after seeking a more peaceable entrance, broke into a house, and took a child sick with smallpox out of its mother's arms, to a hospital. Action for trespass was dismissed, because the statute permitted health officers of a town in which a person was affected with a disease dangerous to the public health to remove such a person to a separate house; but the court called attention then

25. 2 Pa. St. 366.
26. 8 N. Y. St. Rep. 143.
27. 152 Mass. 540.

to the fact that such power must be clearly given in the statutes.[28]

In an early case in Maryland,[29] the court held that the health officer must send a patient to the hospital if in his opinion such a course were necessary, and it further held that the health officer alone could decide how much it was necessary to do, and the captain of the boat on which the smallpox had been found must pay the bill. It is doubtful if a court to-day would go so far. In State *vs.* City of New Orleans,[30] the legislative power of the state to decide where smallpox patients were to be treated, was upheld. As opposed to the authority of the health officer to remove a patient against his will, in Boom *vs.* City of Utica,[31] the court said: "A person sick of an infectious or contagious disease in his own house, or in suitable apartments at a public hotel, or boardinghouse" is not a nuisance.

In Kirk *vs.* Wyman,[32] the court further uses this expression:

> **Inasmuch as it is the province of the legislative branch to determine what laws and regulations are necessary to the public health, statutes and regulations made and measures taken under such statutes and intended and adopted to that end are not subject to judicial review; but the courts must determine whether there is any real relation between the preservation of the public health and the legislative enactment, or the regulations and proceedings of boards of health under authority of the statute.**

There is an old adage: "In time of peace prepare for war." If we wait for an epidemic before the due process of law, we may find our hands occupied with the preliminary preparations, when we should be engaged on the firing line. That has been the experience in the beginning of most great epidemics. Due process includes the argument of the defense. Education is a portion

28. Haverty *vs.* Bass, 66 Me. 71.
29. Harrison *vs.* Mayor of Baltimore, 1 Gill 264.
30. 27 La. 521.
31. 2 Barb. 104.
32. 65 S. E. R. 387.

of that due process. The education is not complete until a decision is reached. The decision may be in the legislature. If it is not there, it is likely that it will be in a court. For the benefit of each side the decision should be reached when time is not an important element. If the conclusions are definitely stated in legislative enactment, the fight in the epidemic will not be along the whole line, but in a limited section. On the other hand, in the absence of such definite statutory enactments, long usage may give a health officer a confidence which is unwarranted, and he may suddenly wake up, as the result of a court decision, to a realization of the fact that his method is illegal. Lieber[33] calls attention to the fact that institutions, though not viciously conceived, may become injurious. They may become hollow and like the empty boxes in an ill-managed house, become catch-alls for rubbish, and thus nuisances. McGehee[34] advises that, when in doubt as to authority, health officials have the matter determined in advance by the courts, for self-protection.[35] It matters not how desirable an object may be of attainment, if the method used is even slightly illegal, it should be abandoned, and a more just way found. In Potts *vs.* Breen,[36] the court admitted the advisability of vaccination, and pointed out the legal method of its attainment. In Boyd *vs.* United States,[37] Mr. Justice Bradley says:

> **Illegitimate and unconstitutional practices get their first footing in that way, namely, by silent approaches and slight deviations from legal modes of procedure.**

A person who knowingly and willfully exposes another to infection is in fact a criminal and he is also liable for civil damages. Intentional wrongdoing is not necessary; all that is necessary to be shown is that

33. Civil Liberty, Chap. 26.
34. Due Process of Law, p. 374.
35. People *vs.* Board of Health, 140 N. Y., 1.
36. 167 Ill. 67.
37. 116 U. S. 616-635.

due precautions have not been used.[38] To-day, many cases of infectious disease are kept hidden, through fear of placards, or of quarantine, or of loss of trade. In many mild cases no physician is employed for these reasons, and because the persons involved do not recognize their responsibility to the community. In this way not only is the danger to the community increased, but very often valuable time is lost, as in diphtheria, and the life of the patient is sacrificed by the delay. A statutory enactment is educational as well. The parent is no longer able to quote the conflicting theories of physicians, of whose relative authority and competence he is incompetent to judge.

Without considering the legal responsibility of the community to care for those quarantined; or the duty of the health service to pay for articles seized, or destroyed; or the liability of a community to those who innocently contract an infectious disease through the inefficiency of a health department; or the desirability of an enactment making school inspections obligatory; it is suggested that much of our present confusion, and possible inefficiency, will be relieved by securing certain statutory enactments.

First: The statutes should definitely specify certain diseases as infectious, and require that they be reported to proper officials.

Second: The hiding, concealing, or neglecting to report such diseases, or a suspicion of their presence,

38. Helland *vs.* Bridenstine, 104 Pac. R. 626, a physician was assessed damages for communicating gonorrhea by the use of unclean instruments.—Supreme Court of Washington sustained. A railroad ticket agent worked while suffering with smallpox. Passengers contracted the disease from him, and were awarded damages against the company (Court of Civil Appeals of Texas, approved M. K. & T. Ry. Co. *vs.* Raney, 99 S. W. Rep. 589).—Damages awarded against a city for typhoid fever from an infected public water supply (Milnes *vs.* Huddersfield, L. R. 10 Q. B. Div. 124).—According to The Engineering News, April 28, 1910, p. 906, the Civil Court, London Assizes, recently awarded damages to the amount of $2,430 against a milk dealer for typhoid fever contracted by a user of the infected milk. The principles are the same as those holding railway companies specially liable for injury to stock when the company neglects fences. Also see City of Pekin *vs.* McMahon, 154 Ill. 141, and the sheep case of Herrick *vs.* Gary, 65 Ill. 101.

should be made a misdemeanor, punishable by fine or imprisonment.

Third: The knowingly or wilfully exposing a person to infection, through neglect of the principles of quarantine, should be specifically made a misdemeanor, and punishable by fine or imprisonment.

Fourth: The statutes should make it obligatory on health officials to maintain quarantine, and the minimum requirements of such quarantine should be stated. It must be recognized that the problems of a thinly settled community are very different from those of the densely populated cities, and power should be given to local authorities to make more stringent regulations in the form of ordinances. In such statutes it must be remembered that the essentials of efficient quarantine differ according to the character of the diseases.

Fifth: The legal status of disease carriers, especially typhoid and diphtheria, should be definitely stated. They should be obliged to report regularly to the local health officer (though not for treatment), and should by law be restricted from engaging in certain occupations, such as around dairies, or restaurants, or other places where they would be likely to spread the disease. No such person should be given a clear bill of health, until after examination by the legal guardian of the public health he shall be found free from evidence of disease.

Sixth: The diagnosis of the health official should be considered final, subject only to an appeal to his superior. In a recent case in California, in one of the lower courts, physicians were permitted to testify to fact, not expert opinion, in the diagnosis of disease. It was recognized that they used their expert training to make the diagnosis, but having made it, the court accepted it as fact, not opinion. There is no reason why a man should not testify that a disease is typhoid, more than that he should not testify that a certain animal is a

horse. In the absence of such a declaration on the part of the legislature, the diagnosis of a competent health officer may be off-set in the courts by the testimony of an irresponsible private physician. Mistakes of diagnosis may occur, and private individuals be injured thereby, but the danger to the community will justify such a provision. *Salus populi est suprema lex.*

Seventh: In the case of an infectious disease it should be obligatory on the local health officer to give to the persons responsible for the care of the patient printed instructions, or orders, regarding the case, including the care of discharges from the patient, and violations of such orders should be punishable. Such instructions should not be left to the attending physician, unless he be official.

Eighth: Release from quarantine should be only on the signed permit of the official. School boards should not be permitted to accept such certificates from the attending physicians, unless they be official.

Ninth: Health officers should be obliged by the statute to keep as complete a record as possible of the circumstances of the infection, and trace, if possible, the source of infection, and the means of the communication. For legal, as well as scientific reasons, such a record should show the result of bacteriologic or blood examinations, and whether such tests were made officially, or by private practitioners.

Tenth: The statutes should give to the health officials authority to remove a person sick with an infectious disease to a hospital, or other suitable place for treatment and isolation. Such removal should be made discretionary, not obligatory.

Lastly, provision should be made for emergencies, and health officers should have certain liberty of action in the presence of danger, which is not provided against in the statutes.

701 Davis Street.

ABSTRACT OF DISCUSSION

DR. JOHN H. WHITE, New Orleans: There was a time when we were compelled to resort to regulations in health matters, rather than legislation, because of the very scanty knowledge we had of the methods by which the various diseases were diffused in our communities. Fortunately that time is passing. All legislation must be carefully framed so as not to bring the health officer up against a stone wall. There must be some loophole left for him to use discretion. The state from which I come practically entrusts its state board of health with the power to legislate—a power which is absolutely unconstitutional, and which will be thrown down any time that anybody chooses to take it into the supreme court, and leave the boards of health helpless to defend themselves, even though they have been doing exactly the right thing.

Dr. Hemenway's remark about the confidence that the health officer will have when he is backed by law and not by regulation appealed to me very strongly. He can go forward then, because his backing is in line with the law of the land. I have had some experience of my own; by depriving men of their liberty—imprisoning them in box-cars to keep them from disseminating yellow fever—with absolutely no law or regulation behind me, I have run the risk of being deprived of my own liberty; and I have done it so much that had I not passed the statute of limitation on this matter I would be rather afraid to live in the state now.

The health officer, in any community which is able to pay a health officer, should under no circumstances follow a private practice. No matter how honest a man may be, he will have an unconscious leaning, if nothing more, toward his own patients; he will feel averse to getting them into trouble. But in a country village that is utterly unable to pay the health officer more than $100 or $200 a year, the officer is obliged to resort to the practice of medicine, and the village must do the best it can.

The one thing that stood out as one of the most salient points to me, however, was this matter of the insufficient authority of the health officers and others, evidenced in our own work in immigration service, to make a diagnosis and to have it legally sustained. I have had the courts take away a case of trachoma on the evidence of men who said it was not trachoma because there was no law to say that the decision of the medical officer in that case was final. The plague was announced in the city of San Francisco; a judge on the United States bench declared from the bench that he had had evidence submitted to him sufficient to justify him in the assertion that there was no plague in the city of San Francisco and offered to put Kinyoun in jail for saying that there was plague in San Francisco. We can have no stronger evidence than that of the necessity of having law

back of the health officer in every particular in which law can be substituted for regulation.

I know of many instances in which the law against concealment of disease by physician or patient prevented disaster in the endeavor to wipe out disease. Without the ability to force the unwilling to tell the truth, it is almost impossible to wipe out an epidemic in a community. With that ability, the health officer's hands are held up mightily. Such laws as Dr. Hemenway advocates, adroitly framed, leaving as much discretion to the health officer as is consistent with the constitution, and enacted in every state in the Union, would double the capacity of the health authorities for the extirpation of disease.

DR. W. A. EVANS. Chicago: If Dr. Hemenway will read the *Engineering News* for May he will find reference to a civil suit for damages when the act committed was selling milk, which spread typhoid fever. Health officers do not know enough law, and courts take peculiar views on health questions. The Jenkins and Landberg cases are in court. Each of these was decided on the facts and in neither were the facts before the court, or rather each was an expert opinion on the facts and neither witnesses as to the facts nor expert witnesses had been heard. All health department work is based on police power. No health case has had its day in court until the facts have been heard.

DR. W. F. SNOW, Sacramento, Cal.: Vaccination laws have been mentioned during this discussion. I received this morning a letter which states that the vaccination case in California was decided in favor of the State Board of Health. The district courts had decided that our compulsory law was unconstitutional on account of class legislation and that the State Board had no authority in the public schools—the decision as to when vaccination was necessary resting solely with school trustees. The appellate court has just reversed this decision of the lower court and declared the law to be constitutional. The state board now intends to proceed with its enforcement.

DR. HENRY B. HEMENWAY, Evanston, Ill.: The courts have certain methods of procedure which may hardly be gotten around; and the supreme court considers the questions of law, rather than the questions of fact.

PRESENT-DAY PROBLEMS AND PROGRESS IN PREVENTION OF TYPHOID FEVER

WALTON FOREST DUTTON, M.D.
CARNEGIE, PA.

The health of a people is its most valuable asset. This truth has been recognized by most governments of the world. They have found that the virtue of national strength lies, in great part, in the conservation of national health.

The United States government in its battle against malaria, yellow fever, cholera, uncinariasis, and plague, has accomplished much for the common good, but seems to have taken little interest in the prevention of typhoid fever. The first effort of any magnitude in this direction was during the Spanish-American war. The result was a signal, dismal, and disgraceful failure. The camps of Chickamauga, Tampa, Fernandino, Anniston, Mantauk Point, and those in Cuba, were enough to arouse the medical world to the inefficiency of the medical department in the prevention of typhoid fever. The national government's aid in the past twelve years, however, has materially increased, but not to the degree of being of intrinsic value to the people of the country.

It has been, comparatively, a recent procedure for the states and municipalities to take active part in the prevention of typhoid. Rural districts in all parts of the United States and Canada are practically without preventive measures. In northern Canada, during the year 1909, typhoid fever appeared to be generally epidemic, especially in the mining regions.

The preventive measures used are nothing beyond the occasional disinfection of stools and urine with chlorid of lime or bichlorid of mercury, and the boiling of drinking water. Contaminated springs and wells are not condemned, but cleaned out, sprinkled with lime or salt, and used again. Within the scope of my personal knowledge are several dug wells that have been the source of typhoid for twenty years. Any reference to them, however, as a means of infection, is met with apathy on the part of the consumers.

Present-day problems, as well as those of the past, concern, first, the individual; second, the community; third, the state.

In considering the individual, we must take his responsibility or importance as a factor in the causation or prevention of typhoid fever. The individual, in health, may be the means of carrying and distributing typhoid germs, and, in fact, may be the sole origin of the bacilli.

We know with what ease he may carry the bacilli by contact, food, etc., and, on the other hand, through some error of diet or irritation the digestive tract, the colon, paracolon, or the paratyphoid, may, I believe, generate typhoid.

The individual comes to be a factor in the prevention of typhoid through a due process of education and law. He must be educated to know the nature of typhoid fever and the processes by which bacilli may be disseminated. Laws concerning preventive medicine and public health become more forcible through the individual's hearty cooperation.

The problem of the community is somewhat more difficult than that of the individual or the state. An epidemic may present many sources of infection, and the situation may be complicated by the restriction of the authority of the community.

A commendable procedure, however, is the isolation of bacillus-carriers until the microbes can no longer be

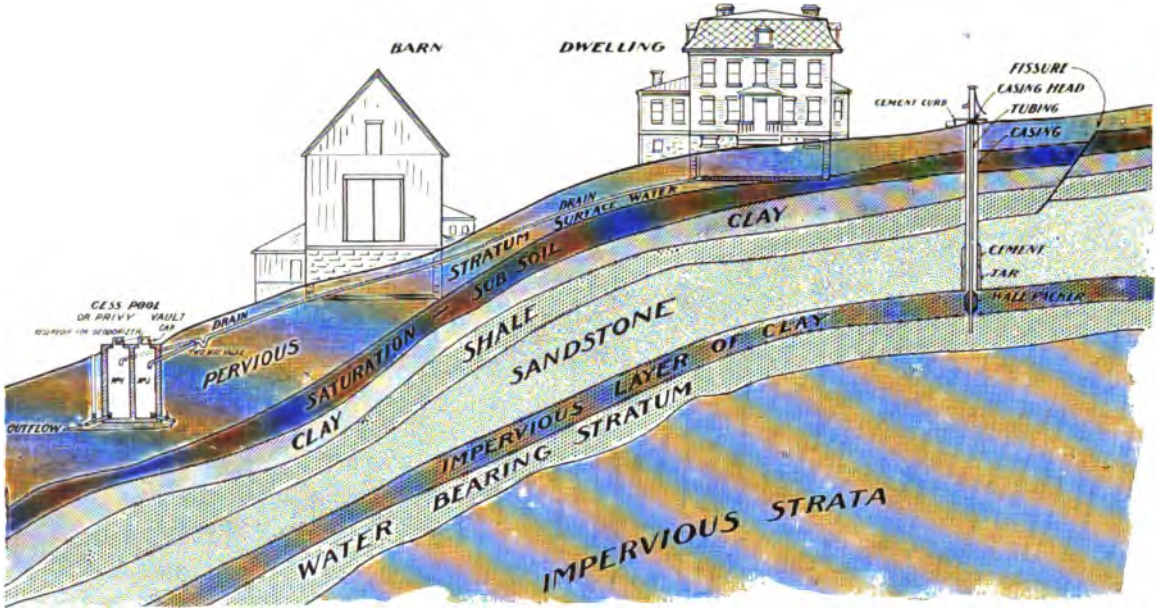

Fig. 1.—The proper method of sanitary construction in rural districts.

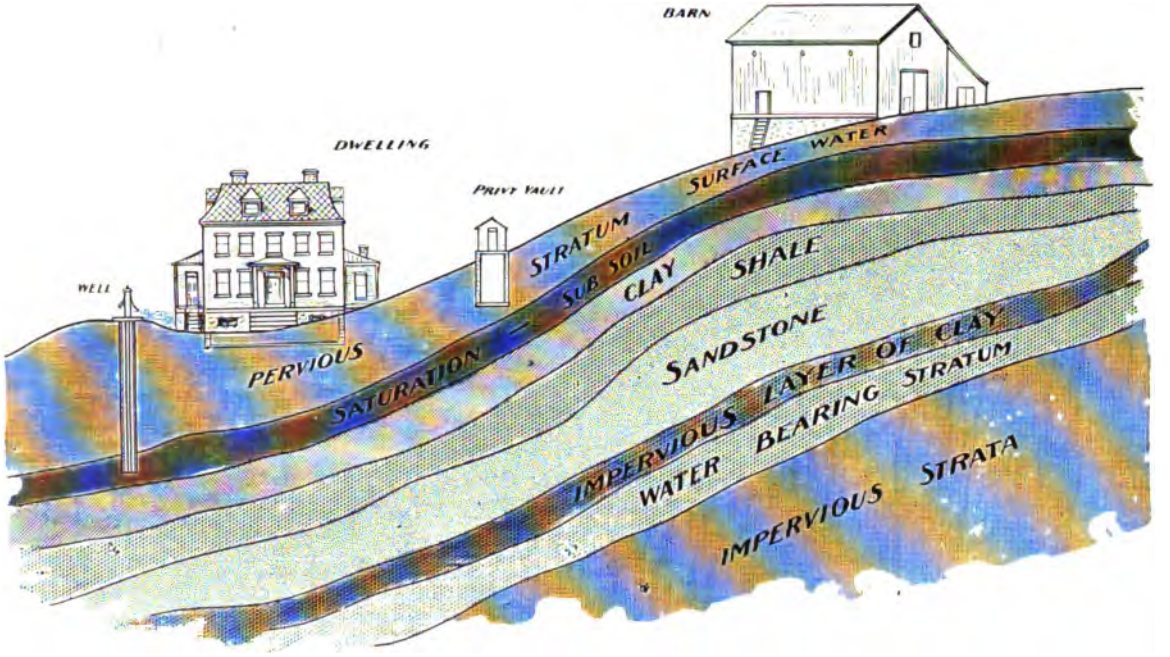

Fig. 2.—Improper method of rural sanitary construction.

found in them. Precautions should be taken that the discharges of the carrier will not be a source of danger to his family, and to others. The individual is warned of the danger of the dejecta, urine, kissing, coughing, etc., and taught the processes of rendering these harmless. He is also to be instructed to wash his hands after defecation, and before handling clothing, food stuffs, or vessels used for drinking purposes. This warning applies to the healthy, as well as the unhealthy bacilli carriers. A very great deal of responsibility

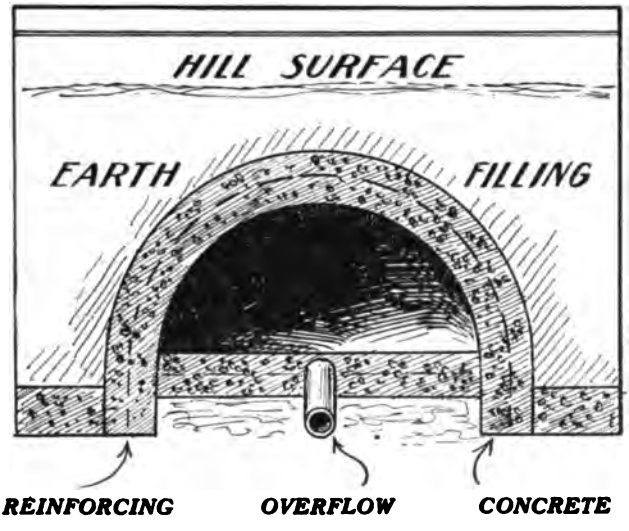

Fig. 3.—Concrete spring cover.

rests on physicians, nurses, and hospital authorities. It requires tact, skill, and ingenuity to impress on indivuals especially, the gravity of the disease, without causing undue timidity on the part of the persons involved.

The supervision of carriers employed as teachers, nurses, cooks, or employes in bakeries, dairies, restaurants, saloons, etc., should be rigid, for the community has a right to insist on the isolation of such carriers, until such a time as they are free from the

germs. Hospitals should regulate their subordinate personnel, keeping careful record of all known bacillus-carriers, and using every precautionary measure to prevent contamination by instruction and enforced cleanliness.

Physicians should keep a record of all typhoid cases and systematize the record of carriers that due prophylaxis may be secured. The healthy, as well as the un-

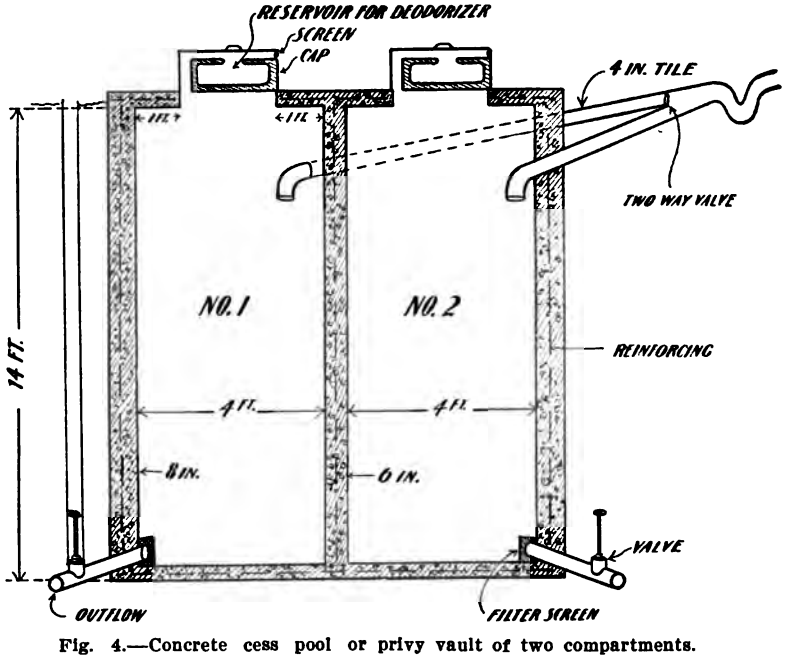

Fig. 4.—Concrete cess pool or privy vault of two compartments.

healthy germ-carriers, may be trained in the importance of prophylaxis, and thus reduce the source of danger to a minimum.

In every case, systematic search should be made for the source of infection, and the finding of bacillus-carriers will prove an important adjunct in the prophylaxis of typhoid fever. The prevailing idea that healthy carriers cannot be brought under supervision like other carriers is worthy of serious thought. The time is near

at hand when the community and the medical profession will have the problem solved for their ready perusal and use.

The state is the great supervisor of preventive medicine and public health. In its hands lies the governing power, which, if duly exercised, can eliminate, not alone

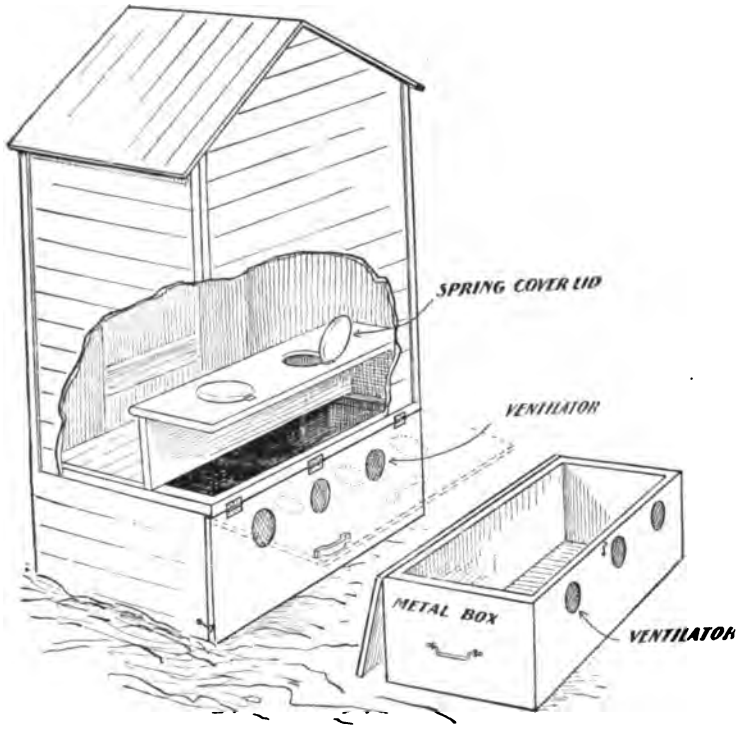

Fig. 5.—Perfection box closet.

the major, but the minor sources of diseases. In Pennsylvania, the department of health, under the efficient supervision of Dr. Samuel G. Dixon, has typhoid, as well as other diseases, under practical control. From this department, means of communication is had, through its police system, with every dale, hamlet, and city, within the borders of the state. Within a few

hours, infectious and contagious disease, in the most remote part of the state, is reported to the department of health and receives prompt attention.

Our present knowledge of typhoid is limited to the following factors as sources of infection; water, food, personal contact with the diseased individual and insects.

A great deal of progress has been made in eliminating water as a factor in our large municipalities by filtration, or by supply from large fresh-water lakes and streams.

The water-supply in small towns and rural districts presents a problem of more difficult solution. I believe however, that this factor may be overcome by proper sanitary regulation and legislation enforcing the protection of wells and springs. (Fig. 1) All wells should be drilled and the supply should be from depths beyond all possible contamination by surface or fissure water. This may be best accomplished by casing the well to or on a stratum of rock or shale which is impermeable to surface, subsoil, or fissure water, and above the supply of water to be used for drinking purposes. A well not cased in this manner my be protected by a wall-packer. It is advisable, whether using a wall-packer or casing on the shale or rock, to run four feet of tar around the bottom; and above the tar, three feet of cement, or vice versa. The top of the casing should be protected with a casing-head, and the pump so adjusted that it will be both water-tight and air-tight. If, for any reason, the well must be dug, the tile (rough stone should never be used to wall a well) should be put down to an impermeable stratum, the bottom protected in the same way as the drilled well, each joint cemented thoroughly and the top protected by a concrete curb, as it keeps out the surface water and is easily cleaned.

The pathetic inscription of "the town pump" might be written as an epitaph on many a tombstone. The vine-covered spring where the wayfarer's thirst has been

Fig. 6.—Well which has been contaminated twenty years.

Fig. 7.—Drainage from house, barn and closet toward spring.

Fig. 8.—Proper location of well with reference to drainage. Privy vaults marked X.

Fig. 9.- Improper location of well with reference to drainage.

quenched and the rock-walled dug well are landmarks of the dark ages of sanitary science. The poetical "moss-covered bucket" has held a beverage deadly to thousands of human beings.

It is therefore time for a change from the ancient custom of placing dwellings, barns, privy vaults, etc., in such a location that they will drain into the spring or well, either over the surface, or through the soil, or permeable stratum (Fig. 2). Springs which may possibly be contaminated should be condemned, or they should be protected by cement or brick (Fig. 3). The shield or covering should be inserted into the surface far enough to shut out contamination from local sources. The basin of the spring may be easily constructed so that it can be cleaned at any time.

Municipal sanitation has taken a step forward in disposal of garbage. Seattle, Washington, Milwaukee, Wisconsin, New Brighton, Long Island, Vancouver, British Columbia, and Westmount, a suburb of Montreal, have destructors in successful operation. The reduction method, used by Cleveland and Columbus, Ohio, seems to be profitable and efficient. The examples set by the foregoing cities should be followed by all other American towns and municipalities. Rural districts, by the use of metal cans and wagons, may accomplish the same end, in an unobjectionable and sanitary manner, if instructed and compelled to do so.

The care of feces and urine presents another problem for rural districts. This problem can be effectually met in three ways.

The first way is by the construction of a double compartment, reinforced concrete cesspool or privy vault (Fig. 4). The cesspool or vault should be so built that only one compartment is in use at one time, thus providing for the disinfection and cleaning of the other.

The second is by the construction of a perfection box closet (Fig. 5). This closet may be so constructed as

to be perfectly sanitary, allowing for free ventilation, providing for disinfection, and screening from insects.

The third is by the use of a closet in which the stools and urine are sterilized or disinfected before being discharged into soil-pipe or drain. All railroad cars and vessels on bodies of fresh water should be provided with closets that disinfect and sterilize the stools and urine before discharging them.

The present method of constructing cesspools and privy vaults is a great error in so far as it pollutes the soil in the immediate vicinity, to say nothing of the drainage to some distance from the cesspool. The seed of disease that is sown in the soil and the subsoil to-day will grow and be reaped in the harvest of disease and death to-morrow.

The law should be so stringent as to compel all patients, who have had typhoid, to carry some efficient germicide that when they urinate or defecate in promiscuous places, the excreta may be rendered harmless.

Much has been said about insect carriers of typhoid, and the best method of prevention of breeding. Manure and other food on which flies and other insects breed should be kept in screened or other insect-proof receptacles. As to the breeding and destruction of insects, the Bureau of Entomology issues literature, which, if the instruction is followed, will in due time eliminate this factor.

Vaccination against typhoid fever is practically in its infancy, yet, I believe, in due time, it will be quite effective and valuable.

I believe that the following provisions should be embodied in state health law: The state should be the supervisor of all water-supplies used for drinking and cooking purposes. It should specify, at all times, from which sources they should come, how they should be protected, and condemn all sources deemed detrimental to health. It should be the duty of the state to enact and enforce such laws as may seem fitting, relative to the

Fig. 10.—Insanitary location of well, cistern, privy vault and stable within twenty feet of each other.

Fig. 11.—Insanitary conditions found in small towns and rural districts. Privy vaults marked X.

disposal of urine and feces from typhoid patients or bacilli carriers. It should be the duty of the state to specify how closets may be constructed on trains and vessels on bodies of fresh water, for purposes of disinfecting stools and urine. The state should specify, in given terms, how springs are to be protected and cleaned; how wells are to be drilled or dug, and protected from contamination. The state should hold equally responsible the individual, property-owner, attending physician, hospital, or whosoever may be found guilty of violating any hygienic or sanitary rule, which will in any manner, whatsoever, disseminate typhoid fever infection. All physicians, hospitals, or those having supervision over typhoid case or cases, should systematize their records in such a manner that carriers may be traced, isolated, and cared for until such a time as they may be free from typhoid bacilli.

409 Fourth Avenue.

THE CURRENTS AT THE EASTERLY END OF LAKE ERIE AND HEAD OF NIAGARA RIVER

THEIR INFLUENCE ON THE SANITATION OF THE CITY OF BUFFALO, N. Y.

GEORGE EDWARD FELL, M.D., F.R.M.S.
BUFFALO

Buffalo for many years has taken its water-supply from an intake near the center of the Niagara River, near its head at Lake Erie. The current at this intake runs from 7 to 9 miles per hour, carrying "220,000 cubic feet per second," which was considered at the time of the location of the intake as a valuable factor, influencing the character of the water through its rapidity. A location much nearer to the American shore or Bird Island pier was recommended by one of the engineers, but fortunately for the future of the sanitation of the rapidly growing city this was not adopted. The general course of the currents at the head of the river and in the lake had virtually nothing to do with the question of location. To the southward the sewage of the city was thrown partially into Buffalo River, which in its current course down the Niagara runs with its contaminated water close to the American shore and gave most positive proof of its virulent nature (Figs. 1, 2, 3, 13 and others).

From the following account of the typhoid fever epidemic (Buffalo, 1894) it is seen how quickly an epidemic can be produced by contaminating the water sup-

ply of a great city. In the month of January, 1894 (official reports), there were twelve cases of typhoid fever in the city; in February eleven cases. Fine ice coming down the river clogged the entrance to the intake in the middle of the river. In the emergency, and as a provision in case of a large fire, the Bird Island inlet (No. 13) at the easterly side or shore of the Niagara River was opened and more or less of the waters of the contaminated Buffalo River pumped into the water-supply in March, 1894. The number of typhoid fever cases jumped from 11 cases in February to 510 cases in March. As soon as the cause of the epidemic was dis-

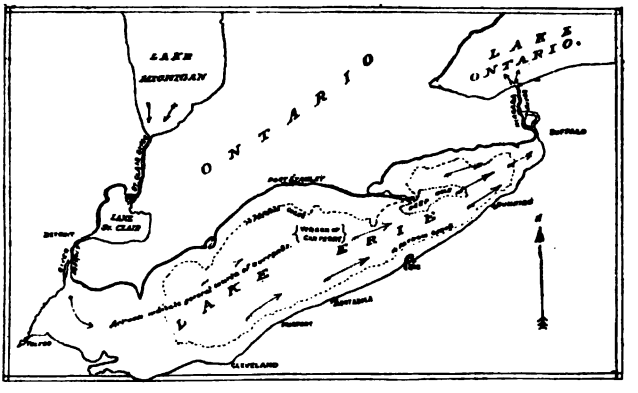

Fig. 1.—Chart of Lake Erie, trend of current easterly. The body of one of the victims of the wreck of the car ferry, shown in the illustration, was found in the Niagara River three or four months after the disaster. It had floated eastward with the current.

covered and the shore intake closed, the cases decreased in number, so that in June, 1894, but 15 cases were reported by the health authorities. Just remember this when we discuss the possibility of throwing an entire winter collection of typhoid epidemic débris into the same water-supply.

Now to indicate that the water of Lake Erie to the southward of Buffalo and about a mile out in the lake is clinically, and virtually bacteriologically, pure, we note

that the intake of the western New York water works, from which the supply to the community of Father Baker, numbering several thousand, has been supplied for years, has never known a case of typhoid fever. This is the character of the water according to the testimony

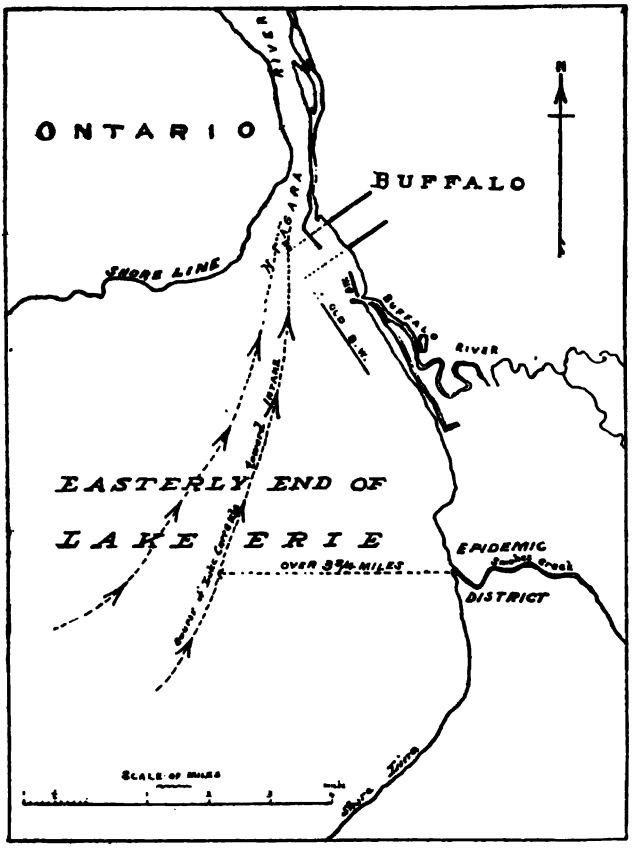

Fig. 2.—Eastern end of Lake Erie, City of Buffalo and head of Niagara River.

of the currents which dominate the area directly westward of the long series of United States breakwaters, which the charts indicate (Figs. 3 and 4 with and without the breakwaters).

CONDITION WHICH BROUGHT ABOUT THIS INVESTIGATION

On the charts (Figs. 2, 3, 4 and 5) will be noted the location of Smoke's Creek, and the Lackawanna Steel Plant, which was under construction when, in the fall and winter of 1903, an epidemic of typhoid fever broke out along the banks of the creek where the laborers were living under deplorable conditions.

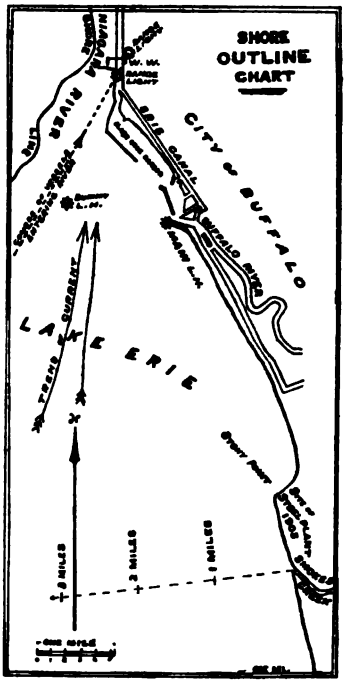

Fig. 3.—Shore outline chart, from Smoke's Creek, the epidemic district to Buffalo Water Works intake.

Happening at the same time as the noted epidemic at Ithaca, N. Y., the conditions were considered somewhat parallel by many prominent physicians. One prominent physician said, (so reported), "What they have experienced at Ithaca we are liable to experience at any time from the same condition." A representative of the state board of health reported, "Existing

conditions were excessively dangerous to residents of the immediate neighborhood, and to the people of Buffalo."

The health commissioner of the city, and 90 per cent. of the physicians of the city through newspaper interviews voiced but one opinion, and that was of positive and certain great danger when the spring freshets carried the débris from the typhoid district at Smoke's

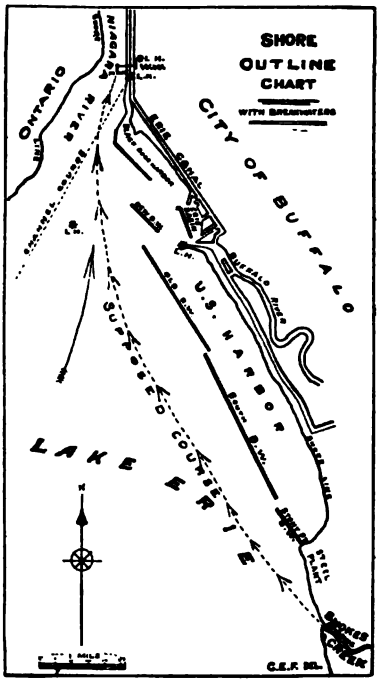

Fig. 4.—Shore outline chart, with breakwaters constructed by the U. S. Government, showing erroneously supposed course of currents from Smoke's Creek.

Creek out into the lake. The epidemic of 1894, costing over a hundred deaths, was not forgotten. But the general belief was openly expressed in one of the most prominent newspapers of the city of March 1, 1903. The article was headed, "Buffalo's Peril and Its Source." A chart of the lake front on the front page of the paper,

depicting the outflow from Smoke's Creek, coursing outside of the breakwaters (Chart 4 with breakwaters), and directly toward the intake, had the following description of the impending disaster:

The above map, showing the source of the city's water supply conveys a striking object-lesson to the people of Buffalo. Near the top is shown the pumping station, where water is drawn from Niagara River to supply the city.

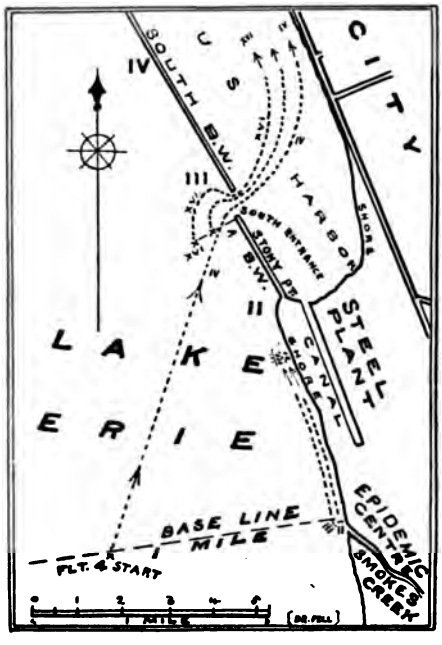

Fig. 5.—South channel entrance, showing actual currents.

At the lower end is seen Smoke's Creek, emptying into the lake its daily burden of pollution in the form of millions of disease-breeding germs, the drainage of the great steel plant colony at that point. The currents all set directly toward the point where the lake empties into the Niagara, and the outlying breakwalls direct this deadly filth-laden current toward the intake of the Buffalo Water Works. (Chart 4.) All winter long an army of laborers have been working at this point and living in improvised shacks on the premises. There is no sewerage, and slops and filth of every description have been dumped in immense quantities on the surface. With the

first spring thaw this entire mass of pollution must inevitably be washed into the lake, and no human power can prevent its being swept out into the Niagara River, pumped into the reservoir, and distributed with its burden of disease and death throughout the length and breadth of the city.

These reports naturally spread consternation in the city, gave the city a bad name abroad, kept industries away (so reported), and did great harm to the community.

When this agitation was its height, I questioned the truth of it, and stated to the editor of a leading paper that there was no reason for such a scare, that it was uncalled for, and that proper investigation of the currents of the lake and river would so demonstrate. My stand was actually ridiculed by one paper. I was berated for presuming to question the statements of the authorities as though an old citizen had no right to assist in protecting the community in which he lived, under such contingencies. It being a public matter, I gave to the public the following statement:

When a careful study is made of the currents at the head of the Niagara River it will reveal that we are not in any danger of having our present intake supply of water seriously infected with septic material coming either from Smoke's Creek or Buffalo River, not only in the spring freshets, but any time under existing conditions.

I was opposed *in toto* to the views of the great majority of our leading physicians and the state and city health authorities. But one physician, as I recall it, Dr. Matthew D. Mann, of the hundreds interviewed, expressed the idea that the currents might avert the threatened disaster.

Through the assistance of the editor of a prominent paper I obtained the use of the little steam yacht *Empire* and its old engineer, and demonstrated to my satisfaction by preliminary experiments, the truth of my assertions. This was as far as I intended to proceed, as I

Fig. 6.—View of south channel in distance from superstructure, Union Bridge.

had not time to give to a more complete investigation of the subject. The mayor of the city, Hon. Erastus C. Knight, knowing of my former experience as a hydrographic engineer, and believing there might be truth in my statements, requested the continuation of the work and gave it his unqualified support. This placed the work on an official basis. The investigations extended over three months of time and were carried on at considerable personal expense, which was never reimbursed.

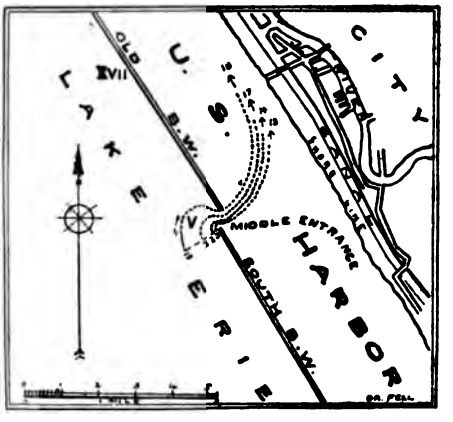

Fig. 7.—Middle channel entrance to U. S. Harbor. Actual currents.

PHYSICAL CONDITIONS

From ordinary observations of the geographical features and the arrangement of the breakwaters at the easterly end of the lake, it would appear on superficial examination that the littoral or shore current at Smoke's Creek would proceed to the west of the breakwater limits. It was found on observations of the current that it passes into the openings between the breakwaters, and that under the ordinary conditions existing when the lake is at normal height and when the gales from the west prevail, the American shore waters at the eastward end of the lake hug closely the easterly side of both

river and lake. If Buffalo Harbor was a landlocked bay, with but one narrow entrance and no outlet, there would be an ebb and flow, influenced entirely by the rise and fall of the lake level as at Erie Harbor (Presque Isle), Pa. At Erie Harbor when the lake rises the water rushes through the one channel opening into the bay at the rate often of 7 to 9 miles per hour, and when the lake falls it passes out as rapidly, according to the rapidity of rise and fall in the lake. This I know from personal observation. It is merely a question of water seeking its own level. But the condition at Buffalo is very different. We have the terrific outflow of Niagara Falls exerting its power at the head of the Niagara (a flow of "215,000 cubic feet per second"). This flow is always to the northward—in one direction. The breakwaters act as barriers holding back the water until it reaches the openings between them, when it passes through, as our floats indicated, but not in sufficient quantity to equalize the level, or to make up for the continuous flow to the northward to the falls. Hence the condition is usually constant, even with sudden fluctuations in the water of the lake, which are usually slight.

DESCRIPTIONS OF FLOATS USED

The float consisted of two tin cans (Fig. 15) tightly sealed, each 3 inches in diameter by 6 in length, the lower one weighted sufficiently almost to submerge the upper one so that the wind would not influence it. The lower one was placed so as to float clear of the bottom of the lake, the observations thus recording the average current—not top or bottom current—of the water through which it coursed. Each float was followed by a policeman in a boat as an absolute necessity to keep track of it, throughout its full course. Many more observations than are depicted on the charts were made, all of which emphasized the fact that the currents follow the courses given in the charts.

Fig. 8.—View of middle channel from roof of Export Elevator.

Complete detail charts are provided showing the course of the current observations, covering the area influenced by the question at issue. They will be described together with the detail of the course of the floats, beginning with those indicating the shore cur-

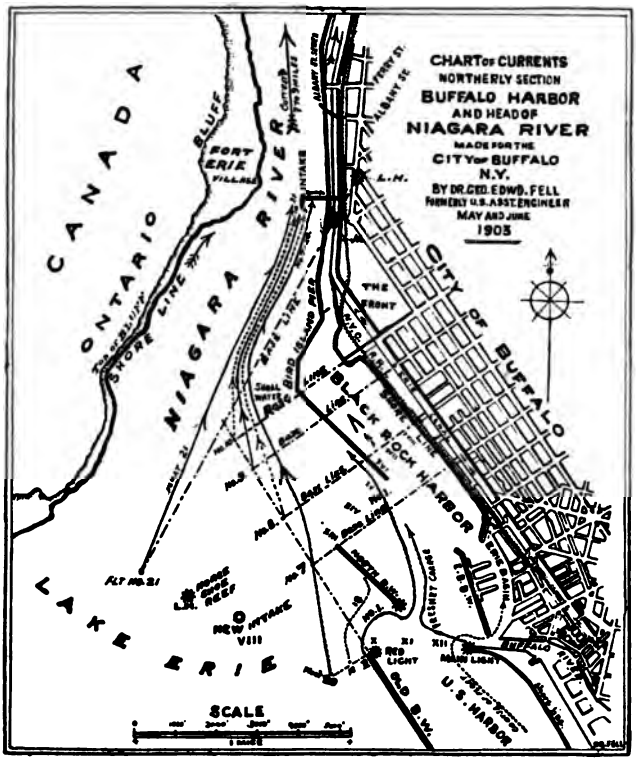

Fig. 9.—Chart, northerly portion of Buffalo Harbor, showing actual currents and main harbor entrance.

rents at Smoke's Creek, or proceeding from the south, northerly.

Observations were made when the lake was under normal conditions as to stage of water, and with light winds, the condition usually prevailing in the summer season.

To appreciate the import of this work it must be remembered that the generally believed course in a freshet of Smoke's Creek was that it would course out into the lake away outside or to the westerly of the breakwater, as shown on the chart (Fig. 4).

CURRENTS AT SOUTH HARBOR ENTRANCE AND SMOKE'S CREEK

Two floats were used here and placed 100 feet and 300 feet, respectively, from the shore at the mouth of the creek. In the course of five hours they had floated northward about parallel with the shore and about a quarter of a mile from their starting point (Fig. 5).

A float was placed one mile out in the lake from Smoke's Creek, and arranged to take in a depth of 28 feet of water. It passed into the South Harbor entrance, as shown by same chart, and what is significant—within a short distance of the northerly end of Stony Point breakwater. Floats located 200 feet, 500 feet and 1,000 feet westward of the north end of Stony Point breakwater passed into the inner or United States Harbor through the south channel entrance, and in a broad sweep well toward the eastern shore of the harbor (Figs. 5 and 6).

As the mass of water passing eastward through the south channel entrance is very many times more than could possibly pass out of Smoke's Creek even when filled to its greatest capacity in freshets, it is reasonable to believe that material from Smoke's Creek does not pass north of the south channel entrance; also that the character of the water passing along the westerly side of the south breakwater is of same purity as that one mile out in the lake at Smoke's Creek. I have already indicated this by the clinical demonstration of the purity of the water used at Father Baker's establishment at West Seneca, which uses water taken from this part of the lake.

Fig. 10.—View of main harbor entrance from roof of Chamber of Commerce building.

MIDDLE CHANNEL ENTRANCE

Floats of suitable depth placed 75, 150, 500 and 1,000 feet, respectively, westward of north end of the south breakwater passed into the United States harbor through middle channel entrance, and in a wide sweep to mid-

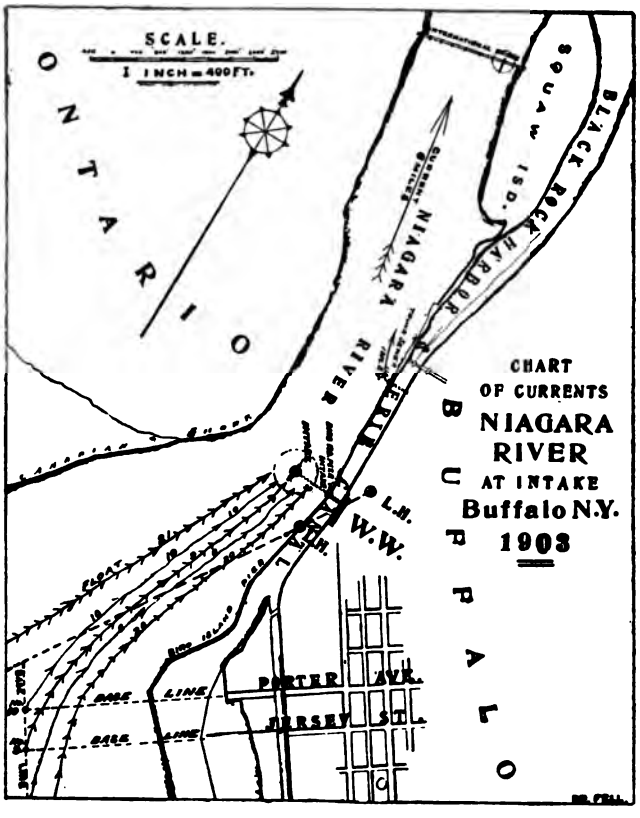

Fig. 11.—Chart of Niagara River at intake. Detail of currents.

harbor, before passing northerly toward the light house pier (Figs. 7 and 8). The conclusion here must be that water coursing along the westward side of the south breakwater, even as far west as 1,000 feet from the breakwater, passes into the middle channel entrance, and makes much more remote the probability or possibility

of any water from Smoke's Creek ever passing westerly of the breakwaters. But let us pass on to the northerly section of the harbor.

OBSERVATIONS NORTHERLY SECTION OF BUFFALO HARBOR AND HEAD OF NIAGARA RIVER

Here we find a most extraordinary and interesting confirmation (Figs. 9 and 10) of the facts which we are forced by these observations of natural conditions to accept, namely, that no material from Smoke's Creek or Buffalo River gains access to the Niagara River intake under normal conditions of wind and weather mentioned, and, in all probability, under no abnormal conditions with which old lake residents, who have observed these waters for many years, of which I am one, are acquainted.

Float 1 (15-foot depth) started at a point 50 feet westward of the northerly end of old breakwater (red light), instead of passing to the northward, as many would believe, passed eastward and southward, fully 150 feet southerly of the north breakwater.

The wind at the time was blowing briskly from the east, which was directly against the course of the current, and the float. Mayor Knight witnessed this demonstration. The idea that the wind produces currents opposing the natural flow of water was proved to be false in this case. The float further coursed in a good sweep to the north and east and lodged against the west side of Bird Island Pier as shown on the chart. This might be called the initial official observation, except that I had known of this current from almost the beginning of the construction of this north breakwater, watching it daily in my trips to what was then my summer home at Crystal Beach, Ontario, and studying it for years since; the fact is emphasized that this current always sets from the lake toward the shore and forces the outflow from Buffalo River and the United States Harbor to the eastward; that all septic material from

Fig. 12.—View of present intake from American shore.

Fig. 13.—View of intake, and Bird Island Pier intake, the latter the source of epidemic of 1894, costing over 100 lives.

14. View of intake, range lighthouse and Bird Island Pier.

these portions of the harbor is actually driven further eastward from the intake pier than it was before this breakwater was constructed. Again, I have frequently observed the outflow of Buffalo River in the spring freshets. From any of the high buildings (Fig. 10) the line of demarcation of the muddy water of Buffalo River can be distinctly seen to the east of the clear blue water of the lake. I have called the attention of several engineers of repute to this fact, which they have verified. The great importance of this current on summing up the results of all these factors, which have been questioned by engineers who have made a cursory examination of the question, will be noted.

Float 19 started 500 feet westward of the north end of the old breakwater, was picked up about midway along the westward side of the north breakwater indicating that at that point the current divides, one portion going north and the other south (Fig. 9).

Float 20 started at a point 1,000 feet westerly and at right angles at the north end of the old breakwater, in 37½ minutes was picked up at the intersection of Virginia Street, prolonged westerly, and the prolongation of the old breakwater northerly. From this point it was again started and followed to a point one-half the distance between the intake and Bird Island Pier, or 320 feet eastward of the pier. Without giving the course of intermediary floats, which show on the chart, it was found that the one started from the intersection of Jersey Street and the old breakwater prolonged took the course to the center of the intake pier. (The new intake takes the same water). From this it is seen that the intake is supplied by water coming from the starting-point of Float 9, intersection of Jersey Street and breakwater prolonged, and which if carried in the regular course of lake flow from the southward strikes a point over three thousand feet westerly of the north end of old breakwater (red light—Fig. 9).

Now let us see what kind of condition would carry any material from Smoke's Creek to the intake under the conditions of wind and weather cited. If we continue the general course of this current further southward to opposite Smoke's Creek it will be found to be about three and one-half miles out in the lake. Hence, to reach the intake pier, material from Smoke's Creek would have to start about three miles out in the lake to begin with. Taking it as it is, material from this creek floats along the shore, but would have to jump

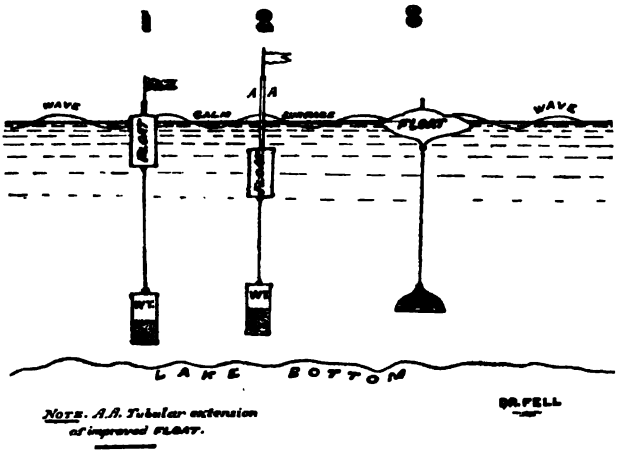

Fig. 15.—Diagram of floats. No. 1 used; No. 2 recommended; No. 3, a form condemned by author as unreliable in light seas and winds.

over 1,000 feet out into the lake before it could pass the current passing into the south harbor entrance. If it could do this it would have to repeat the performance at the middle entrance, and if such an absurd occurrence could take place it would be necessary for the floating material to jump out at least 500 feet at the north end of the old breakwater to prevent being forced around the southerly end of the new breakwater and be carried northward closely skirting the Bird Island Pier at the region of the intake. And again, as I have shown, to reach the intake such material would have to gain a

position at least 3,000 feet west of the north end of the old breakwater to reach the intake pier.

That any one could make the statement that material from Smoke's Creek, in the face of such natural conditions, could reach the intake is absurd, but the assertion has been made by sanitary engineers. No one who valued his reputation would do it after knowing the actual conditions of the currents, which through my investigation was first definitely given to the knowledge of the citizens of Buffalo. The strongest argument in favor of my stand in this matter is that in the spring when the rains poured down, when both Buffalo River and Smoke's Creek were pouring their waters filled with typhoid infection, out into the lake with their fullest flow, no increase in typhoid fever or even in enteric diseases, according to statistics, took place. Had the material from the epidemic district of Smoke's Creek and Buffalo River reached the intake and been pumped into the water-supply, notwithstanding the precaution to boil the water, which was only partially carried out by the people at the time, there would have been a typhoid epidemic such as no large city in the country ever dreamed of, and the prognostications of dire results from the Smoke's Creek epidemic would undoubtedly have been realized. One great point of interest which I believe will make this paper appreciated is the remarkable and wholly unexpected course of these currents, never before studied, and their clear influence in protecting a great city, (through the location of the intake pier by fortuitous decision only, and not from any true knowledge of current conditions based on investigation), from its own infectious factors. The epidemic of 1894, costing over 100 human lives, I may again state proves this point.

Special attention is called to the current passing around the southerly end of the new breakwater. Its influence can be observed, as I have stated, any time in the spring freshets from the high elevations of the large

buildings overlooking this portion of the harbor. It retains the freshets of Buffalo River and all material coming along the shore of the United States Harbor to the eastward and forces it closely along the westerly shore of Bird Island Pier, and much of it passes into Black Rock Harbor and the Erie Canal. From the Morgan building, in which my office formerly was located, I have observed it hundreds of times.

It was natural that opposition to my views based on the results of these extended and careful observations of the currents should persist even after the result was known. It was held that undercurrents, never known to any lake observer through unknown or never-heard-of wind conditions, carried the infection from both Smoke's Creek and Buffalo River out to the Buffalo intake, and also that the north breakwater aided in carrying infection further out in the lake than before it was constructed. And it is on record by one New York City engineer's report that the waters along the westerly side of the old and south breakwaters is seriously contaminated according to his bacteriological reports. I am not entering into any controversy with those who differ from me on this subject at the present time, but present these observations honestly, carefully made, and from an engineering point of view, without triangulation, most interestingly and correctly located and charted.

VALUE OF CURRENT OBSERVATIONS TO THE CITIES ON NIAGARA RIVER RECEIVING THE SEWAGE OF BUFFALO

About the year 1868, prior to the location of the draw of the international bridge (Fig. 11), I assisted in taking triangulation observations of the current of the river for about one-half mile south from and to the bridge site. This work was done at the suggestion of the officers of the Corps of Engineers, U. S. A., to aid in determining the rapidity of currents with reference

to the best location of the draw of the bridge and resulted in a change from the proposed location from the center of the river in 36 feet of water to the eastern side in 16 feet of water. It also demonstrated that at this point the currents followed closely the general axis of the river, so that the pure water of the river follows the Canadian shore, and the contaminated water, owing to virtually the entire sewage of the city of Buffalo being thrown into it, the American shore. If the city of Niagara Falls takes its water-supply from the Canadian side of the river at a suitable point relatively pure water should be obtained. This observation may apply to many other cities.

It is to be sincerely hoped that the befouling of our potable water-supplies through sewage thrown into the lakes, rivers and streams of the country will be discontinued, as it can and should be.

24 West Eagle Street.

ABSTRACT OF DISCUSSION

ON PAPERS BY DRS. DUTTON AND FELL

DR. H. W. HILL, Minneapolis: Dr. Dutton spoke very strongly about the question of typhoid from wells. I cannot speak for any other state than Minnesota, but I know that typhoid from wells is very uncommon in that state, probably for the reason that the character of the soil is such that the contamination is filtered out before it reaches the well. Our rural typhoid is practically never from wells in our state. Our well typhoid has been, as a rule, from the public wells of large communities infected very seriously with pollution of various kinds carried directly into them.

DR. C. HAMPSON JONES, Baltimore: Baltimore is considerably interested in the control of typhoid fever. In a résumé of the subject for a period of four years, which was published in our annual report of 1907, I mentioned the ten possible sources of typhoid fever in the city. Contrary to many excellent authorities, I believe that a great deal of our fever comes from the pollution of the water supply. The characters of the outbreak of typhoid fever due to milk infection are so peculiar, so clearly defined, that it is quite easy, I think, for us to detect practically every milk outbreak. In one there were 157 cases on one man's milk route; in another about 58 cases,

and there were three or four others, which fortunately were checked in the very beginning of the outbreak, which produced only a few cases. We have followed out also the typhoid carriers, and we have had two very interesting cases. One was in a home for young women. The woman in charge of the pantry—of the foodstuffs—was discovered to be a typhoid carrier, after there had been fourteen cases of typhoid fever in this place. We excluded the possibility of the milk being infected, and also the water supply in that special locality. Dr. Stokes, our bacteriologist, followed out two carriers lately in a convent where there was a laundry; in it were a large number of colored girls. Two sisters in charge of the girls were the carriers, and the curious and interesting part of it was that there were two distinct outbreaks—one of paratyphoid fever and the other of pure typhoid. One sister was a carrier of the typhoid organisms; the other sister was the carrier of the paratyphoid; the children associated with each case developed typhoid fever according to the sister in charge of them.

In Baltimore we are about to perform an experiment on a great scale. We are putting in a sewerage system including the entire city. We will in a few years do away with all privy wells, of which we now boast in the neighborhood of 70,000. Just previous, however, to the doing away of these privy wells, the drinking water will be filtered. This will enable us to determine how much, if any, typhoid fever was due to both and to each.

Dr. Liston H. Montgomery, Chicago: There seems to be a good deal of difficulty in taking care of the welfare of the people in public health matters in certain communities. May it not be due frequently to the fact that a layman has been appointed as the official health officer? I think this condition prevails in some portions of the northern states as well as in the South. People are not prone to look on a layman as very much of a medical scientist, especially when it comes to the matter of pollution of well waters, cisterns and rivers and streams, or in the matter of the eruptive diseases, and do not respect his opinions, and therefore may be careless in carrying into effect sanitary measures in detail.

Dr. W. Forrest Dutton, Carnegie, Pa.: I think it is a grave mistake on the part of the municipalities and the health officers in rural districts to countenance the pollution of soil. Some of our most eminent sanitarians are working on the question of soil pollution year after year, not alone with typhoid but with other diseases; Dr. Stiles, I think it is, has pointed out to us most forcibly the effect of soil pollution; and in most of our northern states, especially those that have been settled for two hundred years, soil pollution is a serious problem that will remain with us as long as we

will countenance these open privy vaults. I believe that the state of Pennsylvania has caused to be constructed within the last few months privy vaults that are to be bricked up about half way, and then are to be cemented the rest of the way up with an ordinary covering over the vaults, and has prohibited the discharge of sewage into certain streams. I think that is a grave error. If they are going to compel the citizens in the rural districts to construct privy vaults, why not erect them properly, so that there will not be this pollution of soil that has been going on for years? We have regular epidemics of typhoid fever which may not be due to the water originally, but to drainage from privy vaults into the soil. According to a great many eminent authorities these bacilli are viable for an indefinite period, possibly multiplying in the soil, and as far as Dr. Hill's reference is concerned, Minnesota is comparatively a newly settled country, and a hundred years from now if they allow this soil pollution to go on they will have the seeds of disease sown that will be reaped by future generations.

THE RÔLE OF SURGERY IN PREVENTIVE MEDICINE

MILES F. PORTER, A.M., M.D.

Surgeon to Hope Hospital, Professor of Surgery in the Indiana University School of Medicine

FORT WAYNE, IND.

I wish first of all to assure you that I fully appreciate the honor conferred on me by the Chairman, Dr. Hurty, in inviting me to read a paper before this Section. An invitation to present a paper to one's own section is an honor; an invitation to read before a section other than his own, is a greater honor, and such an invitation extended to an outsider from this Section a still more distinguished honor. For the work of no section of this truly great American Medical Association of ours is of as great import to humanity when measured by human life, usefulness, happiness, or money, as is the work of this Section.

No evidence need be adduced to prove to this assembly the truth of this assertion, but it may be well for the sake of those less well versed than you in preventive medicine to quote the words of Kober,[1] which appear in his article on Typhoid and Tuberculosis:

> Our annual mortality from tuberculosis is about 150,000. Stopping three-fourths of the loss of life from this cause and from typhoid and other prevalent diseases would increase our average length of life fifteen years. There are constantly about 3,000,000 persons seriously ill in the United States, of whom 500,000 are consumptives. More than half of this illness is

1. Am. Jour. Med. Sc., November, 1909, p. 653.

preventable. If we count the value of each life lost at only $1700, and reckon the average earnings lost by illness at $700 a year for grown men, we find that the economic gain from mitigation of preventable disease in the United States would exceed $1,500,000,000 a year. This gain, or the lengthening and strengthening of life which it measures, can be had through medical investigation and practice, school and factory hygiene, restriction of labor by women and children, the education of the people in both public and private hygiene, and through improving the efficiency of our health service, municipal, state, and national.

And I may add that according to Professor Fisher, of Yale, 600,000 human lives are needlessly sacrified in the United States every year. This being my attitude toward your work you will understand how I value the honor of Dr. Hurty's invitation and appreciate the great responsibility which it entails. If I succeed in the slightest degree in adding to the scope or efficiency of your work my reward will be ample.

When I read Dr. Hurty's letter asking me to read a paper before the Section on Preventive Medicine and Public Health my first thought was that from surgery to preventive medicine was rather a far cry, and coupled with this thought was another to the effect that Dr. Hurty might have extended me the privilege of choosing my own subject. On more mature deliberation, however, I came to the conclusion that there was, or should be, an important rôle for surgery to play in the drama of preventive medicine, and that Dr. Hurty in choosing my subject for me had in no wise damaged his well-earned reputation for thoroughly understanding his own business. I know of no one who has treated the subject and hence it becomes necessary for me to blaze the trail. To me the scope of the subject assigned me appears so wide that I can not do more than present a bird's eye view of it in the time allotted.

By the removal of infection atria surgery may do much to prevent disease. That adenoids and diseased

tonsils and gums are the port of entry for many serious infections, among which may be mentioned tuberculosis,[2] typhoid, and diphtheria is well recognized, but it may be well to mention here the etiologic relationship these conditions seem to bear to more rare but yet important infections such as noma and acute poliomyelitis. The evidence is well-nigh conclusive that in the Scandinavian epidemic of poliomyelitis the contagion entered by way of the nasopharynx, and in a personal letter H. W. Hill, of the State Board of Health of Minnesota, says he strongly suspects that the same is true of the late epidemic in his state.

After considerable study of the subject and a limited personal experience I am convinced that the important practical fact concerning noma is that it is above all else an expression of a lowered vitality, consequent on antecedent disease. In Neuhof's[3] recent report of eight cases there is not to be found one primary case. Measles preceded the noma in all cases and both measles and ulcerative stomatitis in six cases. Perhaps in the majority of cases this antecedent disease is medical rather than surgical, but in not a few cases it is surgical, and timely, intelligent, surgical treatment might avert the catastrophe. I have in mind especially diseases of the mouth, teeth and nasopharynx.

Such deformities as club-foot, hernia, etc., prevent their possessors from living correct lives and thus lower resistance to disease. Not only does removal of these disabilities conduce to greater physical strength, but I am constrained to believe that the psychic improvement is quite as important. Compare, for instance, pictures of club-foot patients taken before and after cure, and you will, in the older patients, quite often see almost as

2. According to Chiari (Berl. klin. Wchnschr., 1899, Nos. 45 and 47) adenoids are the primary seat of tuberculous infection in 5 per cent. of all cases. Recent observations of Murphy especially, seem to show that the majority of joint infections are due to bacteria which enter the blood via the nose or throat.

3. Am. Jour. Med. Sc., May, 1910, p. 705.

much improvement in the facial expression as in the form of the feet. I can not but feel that this improvement in expression marks a change for the better in the patients's attitude toward life, which is a health asset of real value. If this change for the better is brought about by relief in the older patients, it is a fair presumption that the deterioration might be prevented by early operation.

Not only should local tuberculous lesions be cured in the interest of the patients themselves, but when these lesions are discharging, the interest of the community quite as forcibly demands that they be cured.

The only reason why patients with tuberculosis of the urinary tract or patients with anal fistulæ are not so great a menace to the public as are those with pulmonary tuberculosis is that the bacilli from the former are usually dropped into the closet. Too little attention is paid by surgeons generally to minimizing the dissemination of pus-producing bacteria by patients, especially those patients with comparatively trivial troubles, who are going about, and perhaps dressing their lesions themselves. Suppurating lesions should be treated with the welfare of the public in view as well as that of the patient. Ordinarily the surgeon is content if he treats his patient properly and does not himself carry the infection. Is it not his duty also, through proper instruction to these patients, to prevent them from spreading the infection? Does it require a great stretch of the imagination to suppose, for instance, that a child with a discharging ear is in a certain degree a menace to others, and especially to the mother who happens to be confined during her ministrations to the child?

Notwithstanding the activity of the otologists, deaths from brain abscess, meningitis and thrombophlebitis resulting from neglected middle-ear disease are all too common. Like laceration of the cervix, phimosis has

been blamed as causing almost everything in the way of illness from pain to paresis, and it is quite probable that circumcision, like cervical repair work, was for a time overdone; but to-day the pendulum has swung too far in the other direction. From an experience by no means small I have come to regard phimosis as one of the most productive causes of hernia in children; as a frequent cause of cancer of the foreskin; and a frequent cause of serious nervous manifestations. Moreover, a tight foreskin is neither comfortable nor cleanly; and it not only makes its possessor an easy prey to venereal infection, but what is of greater importance, enhances his ability as a carrier of infection.

The importance of long continued irritation as an etiologic factor in cancer grows as our knowledge increases. Many cancers of the stomach might be prevented by early surgical intervention in gastric ulcer. Stone as a cause of cancer of the kidney has long been recognized. In the Mayo clinic two cases of stone associated with cancer of the kidney were met in a total of sixty cases. In an experience covering twenty cases, or less, I have met two cases.[4] In three cases of large polycystic kidney I found carcinoma twice. Both were in male patients over 40. In one there was also a pelvic stone, but in the other nothing but the polycystic condition with cancerous degeneration.

I have seen sarcoma engrafted on a fatty tumor of the elbow in an elderly woman. The tumor was situated on the flexor side of the joint where it was many times daily subjected to pressure. What surgeon of experience but has seen many cases of carcinoma or sarcoma commence in warts, moles, eczematous patches and fissures? It is my firm conviction that by timely surgery cancer could be prevented in a large percentage of cases. Most

4. My second case of cancer with stone occurred after my paper on nephrolithiasis, read before the Section on Surgery at this Session, was written. Hence in that paper only one case is reported.

of the cases of cancer cured by surgery are those which are cured before they come, plus those which are cured before the diagnosis can be made save by the microscope; and herein lies the cause of cancer quacks' continued popularity: "Didn't he cure Belinda Brown of a cancer which commenced just like that one which killed Sarah Smith?" The point I wish to make is this: that by removing causes of irritation in the shape of gastric ulcers, lacerated cervices, phimoses, gall-stones, kidney-stones, warts, moles and other non-malignant tumors and causes of irritation, surgery can prevent more deaths from cancer than it can by the removal of cancerous conditions after such a diagnosis is possible. I venture to suggest here an addition to our cancer vocabulary, viz., potential cancer. Through a personal communication from Dr. H. K. Mouser[5] I learned that of the epileptics in the Indiana School for Feeble-Minded Youth 17.64 per cent. have a history of difficult labor, and that of all the inmates the percentage of difficult labor in 727 cases in which the birth history is given is 11.69. Practically all children who suffer from cerebral hemorrhage produced by birth injuries are permanently disabled, and 30 per cent. of those who recover develop epilepsy.[6] Ten per cent. of the cases of infantile convulsions and practically all cases of congenital palsy are due to abnormal labor.

What does "abnormal" and "difficult" labor mean in these instances? It means version, high forceps, and labor terminated by the unaided forces of Nature after an unconscionable lapse of time and expenditure of maternal energy. In these so-called abnormal labors the maternal mortality is 1.14 per cent., the maternal morbidity is 42 per cent.; over 20 per cent. of the children die,[7] and 10 per cent. of those that live are seriously

5. Internat. Jour. Surg., September, 1909, p. 269.
6. Progressive Med., March, 1907.
7. Progressive Med., March, 1908.

injured as a result of birth injuries.[8] Couple these facts with those just given concerning fetal morbidity in this class of labors, and see if you do not agree with me in the assertion that timely, courageous and intelligent obstetric surgery can prevent much of this morbidity and mortality. Some experience and a careful study of the subject forces me to the conclusion that Cesarean section in competent hands could prevent much of this loss of life and usefulness.

In the preparation of a paper on Cesarean section for the Southern Surgical and Gynecological Association[8] I gathered through correspondence the opinions of a number of men of experience on this subject. Permit me to quote four, which fairly represent the concensus of opinion of the whole.

Newell of Boston says:

> In the first place, the elective operation done before labor, in the absence of complicating disease, with the patient in good condition, is, in competent hands, a safe surgical procedure, and I believe the morbidity in these cases is very slight and certainly very much less than could be claimed for the ordinary obstetrical operation in the same class.

De Lee thinks that "Cesarean section ought to have a wider field and should replace many of the brutal forceps and version operations." Davis says:

> Elective Cesarean section by competent operators, on uninjured and uninfected patients in good condition, gives at the present time the best chance of life and health to the mother and child in cases where mechanical disproportion or physiologic incompetence to endure labor are markedly present.

Hirst (who has done 80 Cesarean sections, with 5 deaths) says:

> My recent experience convinces me that Cesarean sections may be done with impunity after hours of labor, if the woman is not infected and the technic of the operation is as good as it

8. Porter, M. F.: Elective Cesarean Section, THE JOURNAL A. M. A., March 20, 1909, p. 937.

ought to be; the mortality even in infected cases need not necessarily be excessively high.

That prompt surgical treatment in birth injuries will prevent many deaths, and much invalidism, most of which is worse than death, no one who has studied the subject will deny.

As intimated in the beginning, this paper can be little more than suggestive, but if it is instrumental in arousing an interest in the subject commensurate with its importance, then my object has been accomplished.

West Wayne Street.

TUBERCULOSIS IN MARKET MILK OF CHICAGO

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During the summer of 1909, a series of examinations of market milk was undertaken in Chicago, at the instigation of the Commissioner of Health, Dr. W. A. Evans. Several similar investigations have been reported in other localities in the United States during the past two years, the results of which bring out clearly the high incidence of tubercle bacilli in milk-supplies and the consequent importance of milk control from the standpoint of public health. It is believed that the results herein recorded, inasmuch as they give insight into the milk situation of another of the large municipalities of the country, will be of interest as adding to the general fund of knowledge on the subject.

The work was undertaken during the months of July and August, 1909, and carried out partly in the Bacteriological Department of the University of Chicago under the direction of Dr. P. G. Heineman of that institution, and partly in the Municipal Laboratory of the Department of Health, City of Chicago. The results of the work in both laboratories will be reported jointly, in order that from the larger number of samples thus available for study a more accurate idea of the extent to which the general supply was effected may be obtained. In addition to the reporting of results, it is my purpose to discuss briefly a few of the considera-

tions which naturally arise in connection with the choice of the remedy to be applied.

The samples were collected by health department inspectors, and were brought in partly in original containers and partly in sterilized bottles furnished by the Municipal Laboratory. The effort was made, as far as possible, to deliver the samples to one of the laboratories within a few hours of the time of collection. It was arranged that the dairy inspectors working in the neighboring country districts should submit samples from the country shippers to the Municipal Laboratory. In addition, a milk inspector was detailed within the city limits for collection of market samples from depots, stores, wagons, etc., with the idea of covering, in as representative a manner as possible, all types of places in which milk is sold in Chicago. Samples collected within the city limits were delivered to the Bacteriologic Laboratory of the University of Chicago.

The technic employed in the laboratory at the University of Chicago was as follows: Three hundred c.c. of the sample were centrifugalized for thirty minutes at a speed of about 1,200 revolutions per minute. The layer between the cream and the sediment was then removed by means of a sterile pipette and the sediment and cream thoroughly mixed. This mixture was diluted with sterile saline solution to an amount sufficient for the injection of three guinea-pigs, using from 1 cc. to 2 cc. for each injection. All inoculations were made subcutaneously in the abdominal wall, the syringe being cleaned and sterilized by heat after the injection of each specimen of milk. The pigs were kept in clean cages and observed for a period of three months. Animals showing glands at the end of six weeks were separated from the others. Tuberculosis was determined by the gross lesions and by smears prepared from the affected organs. The same general method was followed at the Municipal Laboratory of the health department with no essential differences in detail, except that one

animal instead of three was used for each specimen. In the Municipal Laboratory the gross autopsy findings were confirmed by demonstration of the tubercle bacilli in stained sections of the organs, the slides of which are now on file in the health department. It is to be noted, however, that, inasmuch as the clinically negative animals were not subjected to autopsy, but in both laboratories were allowed to live and be used for other purposes, the results of the series must be reported as minimum findings only. No cultural studies were attempted to determine the presence of human and bovine types of the organism.

From a strictly scientific point of view, it is to be regretted that cultures were not made from the organs to exclude the possible presence of Rabinovitsch butter bacillus. It so happened that the autopsies fell due at a time when the laboratories were flooded with other work, and therefore it was necessary to omit this detail for lack of available time. Practically, however, it is our belief that the positive findings here reported may be considered tuberculosis. The autopsies were in every case well marked and typical, and the findings agree well with the results of observers in other cities in the United States.

Incidentally in connection with the autopsy of the animals, it was decided to mount a few of the guinea-pigs by the Kaiserling method for purposes of exhibition. The value of such exhibits in the fight for purer milk soon became evident, and I believe, should not pass without mention, inasmuch as the suggestion may be of use to others who may contemplate the institution of a similar educational campaign. In the conduct of such a campaign, it is very necessary to have at one's command arguments which are convincing to laymen, many of whom are still doubtful as to the existence of bacteria, and most of whom find it difficult to understand how milk, which is perfectly sweet and pure to all appearances, may still be unfit for use and dangerous to

health. In this connection it is hard to conceive of a more concrete object-lesson for the milk-dealer or legislator than to present for his inspection a guinea-pig which has been killed by the milk he is feeding to his children. A normal guinea-pig should also be mounted for comparison, in order that the marks of the disease in the tuberculous specimens may be clearly apparent to any observer.

The total number of milk samples examined in the two laboratories was 163. Of these, fifty-one caused the death of all the animals injected from acute infections within three weeks, before diagnosis of tuberculosis was possible, Eliminating these as lost, there remain one hundred and twelve available for the series, of which ten, or 8.9 per cent., proved tuberculous. Of 144 samples of raw milk, forty-nine were lost within three weeks, leaving ninety-six available for consideration. Of these, ten specimens, or 10.5 per cent. were found tuberculous. Of nineteen pasteurized samples, two were eliminated, leaving seventeen for consideration. None of the pasteurized samples caused tuberculosis in the animals injected.

	No. Samples.	All Animals Died in Three Weeks.	Available for Services.	Per Cent. Found Tuberculous.
Total	163	51	112	8.9
Raw	144	49	95	10.5
Pasteurized	19	2	17	0

With regard to results of other observers, up to the year 1908, a very complete report has been published by Trask[1] of the U. S. Public Health and Marine-Hospital Service, covering chiefly the work of European experimenters. More recently the results of several American observers have been added to the list. Hess,[2] in 1909, examined 107 samples of market milk in New York City with the result that seventeen, or 16 per cent.,

1. Trask, J. W.: Milk and Its Relation to Infectious Diseases, THE JOURNAL A. M. A., Oct. 31, 1908, p. 1491.
2. Hess, A. F.: The Incidence of Tubercle Bacilli in New York City Milk, THE JOURNAL A. M. A., March 27, 1909, p. 1011.

were found to contain tubercle bacilli; Anderson[3] examined 223 samples taken in the city of Washington and reported sixteen, or 6.72 per cent., as positive. Mohler[4] has examined seventy-three samples with positive findings in two cases, or 2.7 per cent. The Bureau of Animal Industry[5] reports two positive out of thirty-six examined, or 7.7 per cent. Goler[6] reports about 5 per cent. of the milk-supply of Rochester, N. Y., infected, but does not state the number of samples examined. The incidence of tubercle bacilli in the milk-supplies of American cities, as far as obtainable, is therefore represented by the following figures, which include the results reported in this paper: Total number of samples examined, 551; total found positive, forty-six; per cent. positive, 8.3.

Without entering into the question of the relative prevalence in human subjects of the human and bovine types of infection, which has been extensively discussed in recent literature,[7] I believe it is safe to say that the problem of tuberculosis in milk-supplies is of sufficient importance to warrant immediate steps for its eradication. Obviously it is desirable and in many instances has been proved practicable to eliminate tuberculous animals from dairy herds by means of the tuberculin test, followed by strict isolation or slaughter of the reacting animals, but this process requires time and also strict legislative support. The difficulties of its accomplishment increase enormously with the size of the community affected and the extent of the dairy districts involved. It has not as yet been proved practical in connection with milk-supplies of large municipalities. But granting its desirability and practicability, it is

3. Anderson: Jour. Infect. Dis., 1908, v, No. 2, p. 107.

4. Mohler: Bull. Hyg. Lab., U. S. P. H. and M.-H. S., No. 41, p. 493.

5. Hyg. Lab., U. S. P. H. and M.-H. S., No. 56, p. 551.

6. Goler: Jour. Am. Pub. Health Assn., 1910, xx, 95.

7. An excellent summary by Moss: Bull. Johns Hopkins Hosp., February, 1909, xx, No. 215; Park: Tuberculosis Congress, Washington, D. C., 1910.

obvious that the public is entitled to protection during the interim required for obtaining the necessary legislation and enforcing such measures when obtained, both of which must necessarily be slow processes. Briefly stated, there is need of immediate protection of milk-supplies, while the more ideal, but necessarily slowly operating measures are being carried out. Such an immediate safeguard is to be had in compulsory pasteurization.

In Chicago the situation is being met in the following manner: The ordinance of Jan. 1, 1909, provides that all milk sold in Chicago, beginning Jan. 1, 1914, shall be obtained from tuberculin-tested cows. During the interim of five years between Jan. 1, 1909, and January 1, 1914, milk not obtained from tuberculin-tested cows may be sold, provided the said milk is pasteurized according to the rules and regulations of the department of health. Under this ordinance about 54 per cent. of the milk sold in Chicago is now pasteurized and 24 per cent. is tuberculin tested. Before the close of the present season, if existing plans are carried out, the remaining 22 per cent. will be pasteurized, and also much of the tuberculin tested product will be pasteurized. During the summer of 1909, when about 30 per cent. only of the milk was pasteurized, strict enforcement of the ordinance being at that time impossible because of administrative difficulties involved, a decrease of 521 was noted in the deaths reported among children under one year from diarrheal diseases. The average bacterial count of raw milk in 1909 was 5,547,502 per c.c.; of pasteurized samples taken from plants, less than 200,000; of pasteurized samples taken from all sources including the output of plants not yet under satisfactory control, and also street samples, many of which had been kept in stores over night, was 944,000 per cubic centimeter. Results in 1910, so far as obtainable, show a greater difference in favor of pasteurized milk, and seem to indicate that the control of pasteurization is becoming more

effective. There is still the problem of preventing the practice prevailing in some retail establishments of selling left-over samples from the previous day's delivery. In my opinion this one detail is responsible for most of the high counts obtained in pasteurized milk and tends to hold the average bacterial counts far above what they would otherwise be. The correction of this error is the next important problem which must be undertaken in the control of the situation.

It may be well to add a word as to the special applicability of pasteurization as an immediate safeguard to the milk-supplies of large cities. That it is effective in the prevention of milk-borne tuberculosis is fully conceded, but the milk situation in large cities involves so many other factors that tuberculosis of necessity comes to be regarded as only one among many sources of danger, several of which are more important from a public health standpoint. In a large city there must always be present the element of distance between the producer and consumer. Contingent on this necessary condition are the thousand and one sources of contamination occurring as a result of multiplicity of handling, time consumed in transit, improper cooling during transit, etc., all of which factors tend to multiply enormously the common polluting agencies to which milk is subject. The final product, which reaches the consumer, may therefore be dangerous from the standpoint of five or six groups of diseases, of which tuberculosis is probably not the most important. In order of their importance I should enumerate these as follows: First, and by far the most deserving of attention, is the group of infantile diarrheal diseases, which are responsible for about one-third of the death-rate among children under 2 years in our large cities. As to the bacteriology of these conditions we have little satisfactory knowledge, but the evidence furnished by vital statistics is convincing in establishing the important relation of milk thereto. Second is typhoid fever, the relation

of which to milk-supplies is now well understood. Third in rank is tuberculosis. Fourth is scarlet fever. Fifth is diphtheria. Sixth is a group of miscellaneous affections not particularly important in this country, such as cholera, foot-and-mouth disease, milk-sickness and others.

As tuberculosis may be eradicated by strict application of the tuberculin test, so may these other infections be eradicated by the strict observance of sanitary rules in the production and handling of milk. But the enforcement of such observance, as in the case of elimination of tuberculosis from herds, is a time-consuming proposition, involving an educational campaign and the development of an adequate inspection system. The public is entitled to immediate protection, while the process is going on, and for this immediate protection we must turn again to pasteurization. There is certainly no one other agency of purification of milk-supplies which is of such wide applicability. That compulsory pasteurization is practicable for towns and cities under proper supervision by health authorities will, I think, soon be established and generally recognized from the experience of the City of Chicago during the past eighteen months.

ABSTRACT OF DISCUSSION

DR. F. O. TONNEY, Chicago: In reply to a question that has been asked: The bacterial counts here reported were all made on plates which had been incubated at 20 degrees C. for five days. As has been pointed out by Dr. P. G. Heinemann of the University of Chicago in a recent publication, this method gives higher bacterial counts in milk than does the method more commonly used in which the temperature of incubation is 37 C. and the time of incubation 48 hours. For this reason the count of 200,000 probably represents a higher result than would have been obtained by the less rigorous method in more general use. The figure of 200,000 per c.c. represents an average of all plants inspected, and of course includes counts made on the product of pasteurizing plants not yet under satisfactory control, the purpose of the inspection being primarily to correct any errors noted in the management of the establishment.

I think, therefore, bearing in mind the two points above mentioned, that we may consider 200,000 per c.c. a very good figure, especially in view of the great difficulty involved in the enforcement of such an ordinance so soon after its passage. I do not wish to be interpreted as saying that a bacterial count of 200,000 per c.c. on an individual sample indicates a safe product, but I believe that this figure, representing as it does an average on samples from all plants both good and bad, is a satisfactory figure for the first year of the life of the ordinance. Probably the average for the second year will show improvement.

DR. W. A. EVANS, Chicago: There is but one way to answer that question; and that is, that 200,000 at the pasteurizer's side is not a satisfactory bacterial count. The usual bacterial count at the pasteurizer's side was around say a thousand—somewhere in there. A great many pasteurizers just started up last summer; and some of them run high. You see how one of them that would run quite high, would pull up the average. Whatever method of counting was employed, 200,000 would be an unsatisfactory count.

VENTILATION IN SCHOOLS *

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Good air and sunlight are necessary at every age period. Probably this need is never greater than during the school years. From 7 to 17 the body is changing greatly. These are the years of plasticity, and at the same time they are the years in which plasticity begins to give way to crystalizing. It is a bad time for the body to fall below par. Habits are being established. Eye accommodation is finding itself; the shape of the lens is being established.

There is some reason for believing that the body is charged with a certain number of potential units. When a certain number have been used repair is possible, but there comes a point beyond which repair cannot be established. If a child is under strain of eye or brain for ten years in the school room the effect may not be seen at once, yet it will figure in the failures of recuperation which are experienced years afterward. Therefore the school years are tremendously important.

The Chicago schools are heated by hot dry air. In the higher-grade installations the temperature is held at 72 F. The relative humidity is 30. 1,800 cubic feet of air per pupil per hour is pumped into the room. In the older installations we frequently find the tempera-

* This is one of a series of articles on ventilation as follows: (1) Harm of Smoke, Electrification Report to the City Council, Chicago; (2) Ventilation of Street Cars, Electric Railway Journal, Chicago; (3) Principles of Ventilation, New York Med. Rec., May 21, 1910.

ture well over 75 F. and occasionally over 80 F. It has been assumed that because 1,800 cubic feet per pupil per hour is pumped in the ventilation is as it should be. The assumption is rarely justified.

Many clinical observations have demonstrated that school children do not do well in badly ventilated rooms. Dr. A. W. Schram of the Graham School found that such children were prone to infection with the contagious diseases, they had colds, "snuffles," enlarged glands and tonsils. They were mouth breathers; they were pale, flabby, nervous, and subject to headaches. Principal Watt of the same school found that they did not learn readily. They were dull and inattentive.

The windows were raised, the air made fresh and moist, the temperature was lowered to 60 F. and below, according to the outside temperature. The result was that the children were healthier, freer from colds and infections; the "snuffles" decreased. Besides this the children learned faster and better. The prinicpal, viewing it from the pedagogic standpoint, was more impressed even than the school doctor.

LIGHT

As to light, I am strongly of the opinion that the room should be narrow; that it should not be wider than twice the distance from the top of the window to the floor; that the proportion of floor space to wall space should not exceed one to four; that the windows should be so placed that the light comes from behind or to the side of the pupil, or, rather, that in looking toward their books, the teacher or the blackboard they should not have to look directly at a strong light, or their books should not be shadowed so as to strain the eyes.

These effects can be had in various ways. The teacher can be seated at the back of the rooms with the students' backs to the teacher; or shades pulling up from below can make a dark background for the pupils; or the

teacher can be so placed in the room that the wall furnishes a dark background. Blackboards should be treated in the same way.

LOW CEILINGS

Believing, as I do, that the removal of air should be as direct as possible, I believe in low ceilings. Between the ceiling and the heads of the occupants is a volume of warm, foul air which is being chilled and dropping into the breathing-zone all of the time. The less space there is the less foul air there will be to drop back into the breathing-zone. I therefore believe in an 8 or 9 foot ceiling. The operators cannot be induced to heat more than a certain volume of air; they will heat the same volume whether the ceiling is 8 feet or 12. By taking off the extra 4 feet you increase the amount of air which will be furnished in the breathing-zone, and that is what counts.

BACTERIAL AND AIR-CAUSED INFECTION

But the principal thing which should interest us is ventilation. The harm which is done by bad air falls into two general groups: the quick-acting or air-borne infections and the slow-acting or air-caused conditions.

Some illustrations of the former are influenza, common colds and cerebrospinal meningitis, and possibly anterior poliomyelitis, diseases in which the bacteria can be transported considerable distances; pneumonia and tuberculosis, infections which cannot be transported far, and scarlet fever, diphtheria and measles, which can be transported only very short distances. Illustrations of the latter group are drowsiness, sleepiness, mental hebetude, headache, lassitude, muscular flabbiness, anemia, chlorosis, chorea, abnormal menstruation, mental irritability and exaggerated susceptibility.

The causative agents in the first group in the order of their importance are: bacteria, dust, humidity, heat, organic exhalations and odors; carbon monoxid and

carbon dioxid, almost negligible. The causative factors in the second group in the order of their importance are: heat, humidity, organic exhalations, carbon dioxid, carbon monoxid, bacteria, dust, odors. These different elements, with the exception of bacteria, have been so thoroughly discussed that I need not discuss them now.

ARE BACTERIA AIR-BORNE?

Many efforts have been made to discover pathogenic bacteria in air. In these cultures saprophytes usually overgrow, and the tests are negative for tubercle bacilli and the usual pathogenic bacteria. Conclusions that pathogenic bacteria are not spread by air cannot be logically drawn. Efforts to find typhoid in a general water-supply which we are certain is spreading typhoid fever are usually unsuccessful. Efforts to find typhoid in a milk-supply proved epidemiologically to be typhoid-spreading have often proved fruitless. Nevertheless we do not conclude that there is no typhoid there.

The mouth has been filled with *Bacilli prodigiosi*, and Petri plates exposed at varying distances, with quiet breathing, talking, coughing, etc. From this it has been concluded that bacteria can be thrown through the air about twenty feet, and the inference is drawn that that is the limit of the danger zone. The air in front of quiet breathers has been found to have fewer bacteria than when the same air was inhaled. The sum-total of all of these observations is an idea that bacteria are not air-borne; that they are spread by physical contact. I contend that the inference is unwarranted. Such experiments would have to be impossibly protracted to give results from which conclusions could be drawn. A person breathes sixteen times a minute for seventy-five years. The absence of pathogenic bacteria from a given cubic yard of air does not prove that there will not be pathogenic bacteria in some of the other yards of air which the man will breathe in his life-time. And a man contracts tuberculosis only once, scarlet fever and diph-

theria once; few get pneumonia more than once. More than that, let us say that only one man in four gets a tuberculosis infection; that is a total three hundred-year period with sixteen breath intakes during each minute of the three hundred years. What conclusion, then, is justified from a determination of the bacterial content of a single cubic yard of air?

VENTILATION AND HUMIDITY IN SCHOOLS

Ventilation in schools is necessary for comfort during September and October, and May, June, July and August in the Chicago climate. In the South we should add April at the front end of the season and November at the rear end. We may say, then, that a study of ventilation resolves itself into a study of ventilation for the months of November, December, January, February, March and April. It is not of much importance during November and April. January and February are very trying months.

It has been our observation that school air is too hot and too dry. The temperature has ranged from 70 to 80 F.; the humidity has been 30 to 40. The dust content has not been high. The odors are objectionable in certain schools in the poorer parts of town and in many schools on rainy days.

The Chicago schools are heated and ventilated in one operation. The system used is the Waters. The air is taken about thirty feet above the ground. It is not cleaned. It is heated to about 110 to 130 F., according to the temperature of the outside air, the velocity and the direction of the wind and the sunshine. It is discharged into the school room at a point above the head of the teacher, by a large opening. It is discharged under a velocity of 370 cubic feet per minute. It is exhausted near the floor line and usually on the same wall as the inlet. Air amounting to 1,800 cubic feet per pupil per hour is pumped in.

The theory is that the air, being hot and going at a considerable velocity, will rise to the ceiling and flow across to the opposite wall, where it will fall from wall chill and then flow back along the floor to find its outlet. The system is plenum. Should the system work according to theory the breathing-zone of the children at the desks would be dead and therefore polluted air. As a matter of fact there are many currents and the air begins dropping to the floor almost as soon as it issues. The children situated back in the room do not get a very good supply of air. Much of the air short-circuits from the inlet to the outlet after traveling a short distance in the room.

PROPOSED METHOD OF VENTILATION

What is the remedy proposed?

1. Reduce the temperature of the rooms to a maximum of 68 F. This temperature is more bracing. In such a temperature the exhaled air, being hot and moist, will rise right out of the breathing-zone and be replaced by purer air.

2. Raise the humidity to 60 to 70. No possible objection can be raised to this except that it costs money to evaporate water and that the windows will frost when the outside temperature gets to 20 F. and below. The best way to humidify is to introduce a spray of steam into the column of incoming air, if the air is to be pumped in. If the humidity is raised to 60 the pupils will be comfortable with a temperature of 68 F. What is saved on coal as between 72 F. and 68 F. will more than compensate for the steam which is used to humidify. Some of the frosting of the windows can be prevented by putting a radiator under each window. In certain rare instances a fan throwing enough air against the glass to keep it warm can be used to prevent frosting. But what harm does frosting do, anyway? Its harm is negligible as compared with the harm of overdry air. It keeps out

but little light and under certain conditions of sunlight will give a mellower, softer light than the unobstructed pane. If the air is brought into the room through the radiators the air can be humidified by pans of exposed water or by some of the patent radiator humidifiers.

3. Blow out the air in the room at stated intervals. This is best done by raising the windows and allowing the air to blow briskly through. A change of the air four times an hour will be effected by currents which are so mild that they will not lift bacteria. In consequence the bacterial flora of the air neither decrease nor increase unless it is being modified by animal inhabitation. If, however, the wind blows briskly in and out through windows the bacterial flora o fthe air will be reduced 99 per cent. Practically, the way to effect this is to have the teacher throw up the windows when the children go out at recess. When they return they are warm; they have just made heat by exercising. By the time their heat equilibrium has resumed to normal the heat equilibrium of the room will have been reestablished.

4. Decrease the dust content of the air of the school room by having the students at the blackboards use an eraser which is very slightly damp. A piece of cheesecloth fastened over the eraser does well; or the fat can be extracted from an ordinary eraser with ether or naptha. If the eraser is too moist the board dries slowly.

5. Introduce the air into the room so as to keep the expired air as much separated from the fresh air as possible. This means direct removal of the air from the breathing-zone. This cannot be done if the room is heated and ventilated by the same air. Such air is introduced at 110 F. to 130 F. If it was introduecd near the floor and the outlets were placed near the ceiling the hot air would rush straight from the inlet to the outlet and it would be very difficult to prevent great loss of heat. The only feasible thing to do when heating and

ventilation is done with the same air is to put the hot air in high and take it out low. The more rational plan is to have the air enter directly from the outside through holes in the walls, these holes to be closed by adjustable diaphragms. The air should pass directly through radiators and be discharged into the room at such a temperature as to maintain a temperature of 65 F. to 68 F.; other radiation to be placed underneath each window; the radiation to be a hot-water or steam-gravity system. The radiators should have water-evaporating attachments. The air should be introduced into the room at several different points through ducts inside the room, with many openings in the ducts; the exits to be on the inner walls at, in or near the ceiling; the gathering ducts to lead to the attic with the smallest possible number of turns or angles. In a windy, cold climate, such as that of Chicago, the duct should lead to a central large exhaust fan in the attic. In a less cold climate, for example, that of Cincinnati or Louisville, the ducts can lead directly to the roof and open to the outside, surmounted with one of the perflation devices to accelerate suction and to prevent down draft. The philosophy of this suggestion is that when the weather is not extremely cold, and all bends and turns are eliminated from the exhaust ducts, the fans can be eliminated. In a milder climate, such as that at Memphis, the ducts can be made to discharge from each room directly to the outside air, the outlet being at the ceiling line. In the far South, as in New Orleans and Mobile, the windows can be used all winter long, both for inlets and outlets, with this single suggestion, that the radiators be so placed that they will come a foot or two higher than the bottom of the window. When in cold weather the window is raised six inches or a foot from the bottom the cold air which enters through the opening will pass through the radiators.

ADVANTAGES OF PROPOSED METHOD

The advantages of such method over the present method are:

1. The cost of installation will be less than the cost of installation at present employed. The system of ducts is much simpler and the capacity of the fans will be much less.

2. The cost of maintenance will be much less. A. On still days the fans will not run at all. B. On windy days the fans need be used only to exhaust air from the rooms on the lee side. The rooms on the windward side will exhaust without any artificial aid. C. The volume of air needed per pupil per hour can be reduced from 2,000 cubic feet per pupil per hour to 1,000 cubic feet per pupil per hour,[2] or even less where the foul air is removed without much admixture with the fresh. In the language of the British Departmental Committee on Ventilation of Factories and Workshops, 1907, "The quantity of air depends on the distribution; and in many cases a relatively small quantity well distributed is far more effective than a large quantity badly distributed."

The clinical observations on which this paper is founded have been made by the Chicago School Inspectors under the direction of Dr. I. D. Rawlings and especially by Dr. A. W. Schram.

The chemical, bacteriological, and physical examinations have been made by the chemists in the City Laboratory.

The observations on the pedagogic side have been made by Principal Watt.

103 State Street.

ABSTRACT OF DISCUSSION

DR. HENRY B. HEMENWAY, Evanston, Ill.: Dr. Evans has spoken of the trouble with the frosting of the windows. I have made a good many observations since my attention was attracted to the fact that the windows do not frost where

2. Car Ventilation, Elec. Ry Jour., May 8, 1909.

there is a free circulation of air. For example, a house heated by a furnace had two air outlets at the floor at the opposite extremes of the house, and so long as these outlets were kept open so that there was a free circulation—the air being introduced in the center, and out at the side—the windows did not frost; but as soon as either of those registers was shut, there was an immediate frosting of the windows. Use has been made of that principle in store windows, by providing ventilators at the windows. One danger in admitting air near the floor is that it creates currents of air which raise the dust, and with the dust, the germs—for almost all the germs in the room are found at the bottom. Now, the danger is in inverse proportion to the size of the opening. If the opening is small, the draft must be great, and therefore it causes more dust.

DR. SENECA EGBERT, Philadelphia: I would like to ask Dr. Evans whether they did not find the room heated at 68 degrees, with plenty of humidity, apparently as warm as one that was drier and of higher temperature. I was surprised to learn not so very long ago that the temperature of what we would call an ideal June day—a day that would be thought perfect out of doors, where the humidity is probably in the neighborhood of 60—is usually about 65 to 68 degrees. I think that Dr. Evans is exactly right in insisting on that present standard of 68 degrees; and I think later on he will find that a room can be heated just as well with a temperature of even less than 68 and a relative humidity of 60 or 70. As to what Dr. Hemenway has said, we can eliminate our dust nowadays with our vacuum cleaning plants, without which no school building in the future ought to be constructed. We know that the bacteria of disease are associated with the dust. This whole question of ventilation is in one sense a simple one, but practically it is extremely difficult to get good results in a modern schoolhouse of several rooms.

DR. J. N. HURTY, Indianapolis: We can hardly exaggerate the importance of this matter. Let us take care of the children. If you want to help to lift up mankind, you must do something for children. We have pretty high authority, 2,000 years back, for the care of little children, and if we will work for the health of school children, I will warrant you we will have less sickness in after life.

Professor Mott, of Richmond, Indiana, has records kept after a rational system, which prove that the children who go to school in sanitary schoolhouses progress as far in three years as those can in four years who go to the insanitary schools.

DR. W. A. EVANS, Chicago: We have a number of observations tending to show that the children do better, learn faster,

progress more rapidly, where the ventilation is good than where it is bad. One of our inspectors last winter said to a school principal: "I can go through this school and pick out the bright students and those that are dullards, and those that are in between." The principal said: "All right; let's see you try." He tried and the principal said to him: "You have made good. How did you do it?" "I have found," explained the inspector, "that children who have enlarged glands are mouth-breathers, snuffle all the time, will not be bright; so I looked at these things." "Well," the school principal said, "I am convinced; what are you going to do about it?" What they did about it was to put up the windows in that schoolroom. The children in this room are dressed in ordinary street clothing. The windows are thrown up and the room is heated by steam radiation. The temperature in there is usually under 60 and not infrequently is under 50. Every one that has come in contact with those children is of the opinion that they have progressed more rapidly than any other children; and all over Chicago we are getting requests from their parents that their children be taught in fresh-air rooms.

This differs, of course, from the ordinary fresh-air proposition. We have such a school in Chicago that is taking children that have tuberculosis and teaching them on a roof. The children are supplied with meals, given a rest period during the day, and wear clothes that are especially provided for them.

The matter of frosting is purely a question of mechanics. Air that is 100 per cent. humid, at a temperature, let us say, of 40, will be very hungry for moisture at a temperature of 75. Now, if air at a temperature of 80, with a humidity of 60 relative, strikes a window which is chilled to 20 above zero, it will be chilled below its dew-point, and in consequence will precipitate moisture. There are several things that can be done, one is to have an up-current of hot air against that window so as to keep the window-pane warm, so that the air that strikes it will not be chilled to the dew-point. The familiar measure that is ordinarily adopted in stores is to take an ordinary electric fan and force warm air against the window so rapidly, in such volume, as to warm the window and to move the air away before it can be chilled to the dew-point; and in that way the frosting is prevented. There are a dozen ways in which frosting could be prevented, if it is worth while to prevent it. Sometimes it may be, and sometimes it is not worth while.

The point as to relative temperature is, of course, well taken. At a temperature between 60 and 65, with a relative humidity of about 65, we appreciate both heat and cold

least. If the humidity be lessened, the temperature must be raised in order to get comfort. If the humidity is raised to about 65, the temperature can be dropped to 60 or 65 or maybe a little under 60, with comfort. We shall not make any headway in this country by advocating lower temperatures, unless at the same time we stand for higher humidities in the school-room.

EPIDEMIOLOGIC STUDY OF ANTERIOR POLIOMYELITIS IN MINNESOTA

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MINNEAPOLIS

INTRODUCTORY

Extensive studies, clinical, pathologic, epidemiologic, of epidemic anterior poliomyelitis have been made abroad and in this country. Whatever may be said of the two first forms of study, the epidemiologic data in the literature available to me have not been so collected and arranged as to illuminate satisfactorily the chief points of epidemiologic interest. These are the epidemiologic characteristics of poliomyelitis as compared with other epidemic diseases, the degree of contagiousness, if any exist, in the human being, and the ultimate reasons for the existence of outbreaks.

GENERAL ACCOUNT OF MINNESOTA OUTBREAKS

The history of poliomyelitis in this country and abroad has been given by a number of recent writers, and I shall confine myself to a brief account[1] of local conditions only.

This state has an area of about 83,000 square miles, practically ten times the area of Massachusetts. Its population is somewhat over 2,000,000, hence roughly two-thirds that of Massachusetts, yielding roughly a relative density of population of 15 to 1 for Massachusetts as against Minnesota. The foreign-born element forms a large proportion of the whole, and

1. See also Epidemiology of Poliomyelitis, N. W. Lancet, Sept. 1, 1909; Contagiousness of Poliomyelitis, Feb. 1, 1909; Discussion, State Medical Association, Jan. 1, 1910.

consists chiefly of Swedes, Norwegians, and Germans, but includes representatives of all the northern and some of the eastern and southeastern countries of Europe and of various parts of Canada. Although the children, especially the younger ones, are largely Minnesota-born, the adults are chifly from other countries, or at least other states. The southern part of the state is the oldest, most developed, and contains the largest proportion of Americans, although there are also many Germans, or persons of German descent. The northern part of the state, especially the mining and lumbering districts, contains the greatest admixture of the foreign elements. The central part of the state is somewhat an average of the extremes. These obviously are very general statements and the fact that the different nationalities tend to form settlements, each of its own people, has resulted in a number of small communities, one chiefly German, another chiefly Finnish, a third chiefly Austrian, etc. There are eighty-five counties in the state and they thus average about 1,000 square miles each, but the size is variable and three counties could be selected which together would be larger than Massachusetts.

Records for many years exist of scattering cases in Minnesota, but in 1908 the first definite outbreaks occurred. My estimate for 1908 was 150 cases, but only one local outbreak was studied, and that clinically, for the State Board of Health, by Drs. H. E. Robertson and A. S. Hamilton of the University of Minnesota. An outbreak of 34 cases in Northfield in 1908 was not reported to the board and was not studied until a year later. An outbreak of 16 cases in Hibbing was studied by Dr. Bullen, but not reported until a year later. Beginning with July, 1909, I saw for epidemiologic study 161 suspected cases in 124 families at twenty-seven different points in the state. Of these I recorded as poliomyelitis 85 cases; as not poliomyelitis 58, and as doubtful 18. Very careful epidemiologic investigation of these was made, covering "reasonable and even unreasonable" possible sources of infection which were thought of or suggested. My estimate for the total cases with paralysis occurring in 1909 was between 800 and 900. For reasons given further on, an estimate of the alleged abortive cases would be be futile.

In January, 1910, a schedule of forty questions relating to poliomyelitis was sent to every physician in the state. About one-half the physicians responded, and to these I wish to express the sincere gratitude of the State Board of Health, since the time and effort spent on these schedules by those interested enough to respond, while of greatest importance to the state as a whole, to the public and to the profession itself, was without material return to the physician.

Rejecting cases occurring before 1909, and those showing no paralysis, the maximum number available to me for classification (occurring in 1909) from all sources was 333.

Of the estimated total number of cases with paralysis (800-900), about one-third occurred in St. Paul, and were tabulated by Dr. J. M. Armstrong, assistant commissioner of health of that city. Dr. Armstrong kindly forwarded me his data, but time did not permit the inclusion of these cases with mine.

Not quite another third of the total cases occurred in Winona, St. Peter and the neighborhoods of North St. Paul, Hinckley and Hendrum. Reports complete enough for tabulation were received from two of these localities only. Thus the 333 cases I tabulated represent about 40 per cent. of the total estimated cases. While a number of Minnesota physicians have published clinical studies on this disease, and Dr. H. E. Robertson has presented in another section an excellent study of the pathologic conditions, reports of epidemiologic study in 1909 have been confined to those of Dr. Armstrong in St. Paul, Dr. Cowern of a small local outbreak (fifteen cases) in North St. Paul, and my own of the state at large. The latter I confined to the rural districts principally, because I believe that epidemiology is more readily followed in the country districts than amongst the crowded, ever-varying conditions in cities.

In summarizing the results of the tabulation it will be understood that not every case showed data on every point tabulated. Hence I have given for each point of inquiry the number of cases which could be used for that particular point. Of the epidemiologic moot points concerning poliomyelitis, abortive cases, contagiousness and fatality are the chief. I attempt herein to throw light on all three by a careful study of the Minnesota data.

To give the statistics some meaning it is necessary to compare them with figures for other diseases; and I am indebted to the most excellent tables of Chapin[2] on diphtheria and scarlet fever. I have compared the figures concerning the relative contagiousness and fatality by age and sex for these two diseases with those for poliomyelitis on the ground that if the latter be contagious it ought to run somewhat parallel in these respects with the other two diseases, and if it runs parallel its relative degree of contagiousness should be shown. It is true that Chapin's figures are based on majestically large totals, while mine are pitiably small and the conclusions correspondingly loose. So far as the Massachusetts and Wisconsin figures for poliomyelitis are available I have compared them with those for Minnesota, and find a general correspondence.

SHORTCOMINGS OF THIS INVESTIGATION

1. The small total number of cases covered (333). This was unavoidable because more poliomyelitis returns have not yet been had in this state in form to permit tabulation in the time available. Deductions from a small number of figures are of course relatively unreliable, but the correspondence of these figures in their general outlines with those for other places, so far as comparable, make me confident that they express with approximate correctness the facts for the time and place which they purport to represent, and parallel reasonably the facts in other places.

2. The including of approximately only a little over one-third of the estimated cases occurring in the state during the period covered. But the other cases occurred chiefly in cir-

2. An. Rep. Sup. Health, Providence, R. I., 1908.

cumscribed localities, fairly defined, and the present investigation represents fairly well the cases occurring throughout the state at large, particularly in the rural districts.

3. The personal verification of about 10 per cent. only of the cases discussed. But by omitting all unparalyzed cases and all cases which for any reason offered inconclusive clinical evidence, any great error was probably eliminated. The parallelism of the statistical figures in detail with those of other outbreaks in other places, and especially with those for eighty-one cases specifically studied and tabulated by myself, give me confidence that few if any cases have been wrongfully included.

4. The lack of comparison of the date of onset of every case with the official rainfall records for the same locality.

At first sight this may seem a perfectly feasible if laborious undertaking. But various considerations show that the labor involved would be much greater than the mere comparison of these records. The relation of precipitation to the disease is at present of interest chiefly as the precipitation may be a measure of dust. While outdoor dust cannot exist in the presence of long-continued wet weather, its existence during weather alternately dry and showery depends on the amount falling in a given time, and on the run-off, which in turn depends on the nature of the soil, on the topography, on the previous weather conditions, and on the evaporation, *i. e.*, on the subsequent weather conditions. Clay soils, thoroughly wet by a single deluging rain, may remain free from dust in a flat country for a long time, while sandy soils under the same conditions may be as dusty as ever next day. These are matters of every-day observation. Minnesota surface soils vary so greatly in character and topography that only the most general relationships could be expected between precipitation and dust. The more minute relationships could not be studied without a complete geologic, topographic and meteorologic study of every locality involved—quite beyond our facilities.

5. The absence of detailed study of the time, and locality relations of the development of the outbreak, in order to determine any general wave of progress from one part of the state to another.

Such study was made of the earlier cases of 1909, and showed no definite relationships, the cases in order of time being reported from widely scattered and serially unrelated points. It must be said, however, that the existence of cases in 1908, unrecognized, certainly unreported, to the extent of at least 150 cases, and the probable existence of similar cases early in 1909, make it now impossible to trace such relationships minutely. That in general the cases came in at random

from the remoter corners of the state as well as from intermediate points, showing no such relationships, and the further point that investigation when carried out in localities affected almost always failed to trace the remotest connection with known previous cases, tend to make the likelihood of finding traceable sequences even in a broad way extremely small.

6. The omission of statistical comparison of this disease with epidemic cerebrospinal meningitis. The only reason for this is my ignorance of data on epidemic cerebrospinal meningitis of a character comparable with the needed data given beyond for epidemic anterior poliomyelitis. Mere instances and counter-instances of apparent contagiousness or non-contagiousness might be continued indefinitely for either disease without result.

The tabulation and deductions therefrom are based on figures too meager to be of final value, but they indicate a method by which the facts may be sought not yet fully applied by others; they suggest forms of tabulations which if followed in other outbreaks would permit ultimately a compilation of uniform data, from which final deductions may be made; and they indicate pretty clearly the peculiarities of the recent outbreak in Minnesota, even though that outbreak may not parallel conditions found elsewhere.

Before presenting the statistical figures, certain points, not always clearly definite, should be considered.

CONTAGIOUSNESS

Flexner and Lewis have demonstrated a filterable virus, capable of transmission from monkey to monkey, and detectable in the internal nasal region of infected monkeys. But the possibility of a transfer of this kind in the human being, even if confirmed by experimental evidence later, cannot by itself demonstrate that the disease is in fact thus conveyed in a practically significant proportion of cases. The contagiousness which is of interest to the epidemiologist is actual contagiousness; *i. e.*, the quantitative extent of the spread of the disease by the actual production of new cases through the transfer to the patient from an existing case of an infective agent. The distinction between actual and potential contagiousness is one which I have made in previous communications, and it must be insisted on.

To illustrate, smallpox, malaria and typhoid fever are all potentially contagious, but smallpox in a thoroughly vaccinated community, although it throws out its infective agent, cannot produce a new case, from lack of suitable soil. Typhoid fever at all times throws out its infective agent in the discharges. The soil (the bodies of physicians, nurses, attendants, etc.) is usually susceptible, but when properly cared for the discharges do not reach the soil. Malaria, even among susceptible persons, is unaffected in its spread by care or carelessness as regards the discharges, depending wholly on the mosquito for the transfer of its infective agent.

Hence human poliomyelitis, whatever potential contagiousness it may later be shown to possess, may nevertheless accomplish little in the actual reproduction of new human cases—how much or how little it is the function of such studies as the present to determine. If, despite potential contagiousness, actual contagiousness prove small, this lack may depend on one or more of several, at present, hypothetical reasons. The infective agent may not be widely spread from the patient, or may require a peculiar biologic or other carrier, or a peculiarly susceptible or especially prepared soil. Further studies must determine such points. I can personally vouch that poliomyelitis is not prevented from spread, at least so far as the cases here discussed furnish evidence, by care in controlling the discharges, for precautions so efficient as to prevent the spread of the disease from the patient to other members in the house through the discharges were not taken as a rule.

If the infective agent escapes by way of the nasopharynx any great actual infectiveness developed should parallel diphtheria, scarlet fever, or possibly pneumonia, in its epidemiologic characteristics. If by the intestine, it should parallel more or less closely the infectiveness of typhoid fever. If poliomyelitis does not parallel any of these, it would seem uncalled for to insist on its great contagiousness.

ABORTIVE CASES.[3]

Since correct diagnosis is the basic essential of correct epidemiology, the importance of abortive cases cannot be overestimated. The hopelessness of the attempt to show that abortive cases have importance in the transmission of human poliomyelitis by attempting to trace conclusively the transmission of the frank disease through abortive cases is evident when one considers that there is no practical method of determining what is and what is not an abortive case. In abortive diphtheria and abortive typhoid there exist laboratory tests. The mildest forms of smallpox usually show lesions perfectly distinctive to the smallpox expert. Even abortive scarlet fever has the more or less typical throat and often some desquamation to suggest a diagnosis or a reasonable guess at one. But when the large percentage of error which is encountered in the diagnosis of frank poliomyelitis is considered the diagnosis of abortive forms becomes a matter quite as determinable by the tossing of a coin as by clinical observation so far as the latter

3. Abortive cases: Thirty-two alleged abortive cases were definitely reported in twenty-one families and were rejected for the purposes of this classification. But this does not at all represent the number of cases considered abortive by physicians. Abortive cases alleged to have occurred in families, alone or together with cases of paralysis, were extremely numerous, although not officially reported to us, the number in any given locality depending on the clinical interpretation of observed symptoms by the physicians in that locality. In one instance a physician who had absorbed the Scandinavian teaching as to the frequency and importance of sore throat in poliomyelitis reported a total of fifty-six cases. But he agreed with me after we had visited a majority of them together, that clinically three were poliomyelitis, two might have been, eighteen were follicular tonsillitis with extremely slight additional symptoms, possibly interpretable as remotely meningitic, thirty-three were follicular tonsillitis pure and simple. Epidemiologically, however, these cases, to his mind, formed a series from light to severe, despite the fact that in two of the three frank cases there was no sore throat. In another locality one physician reported about sixty abortive cases, and states that he knows that the great majority of cases do not show paralysis. I cannot dispute the opinions of these men with positive proof, but having had reported as poliomyelitis, nephritis, summer diarrhea, pneumonia with convulsions, mild scarlet fever, rheumatism, septic abscess, etc., to say nothing of alcoholic neuritis, cerebrospinal meningitis, brain abscess, etc., I may be pardoned for excluding from these figures anything which does not show at least the minimum essential clinical features, paralysis of the well-known flaccid, atrophic type.

has yet developed. That abortive cases of poliomyelitis exist cannot be doubted on *a priori* grounds alone. That abortive cases exist so nearly frank that no reasonable man could deny the extreme probability that they were due to the same infective agent acting in smaller dose or lessened virulence, or on a less susceptible person, is known to all who have encountered the disease extensively. That a series of decreasing severity may exist down to the case which shows no disturbance at all and therefore has importance merely as a carrier, if even so much, may well be true. But that any given case of this series can be proved to be poliomyelitis at this stage of our knowledge must be obviously out of the question.

Furthermore, even admitting that abortive cases of poliomyelitis were recognizable in all degrees of severity, they would still be on a different basis, as regards the hypothesis of transmissibility, from abortive cases of diphtheria, scarlet fever, typhoid fever, smallpox, etc. In these diseases frank cases are known to give rise to frank cases, by evidence absolutely indisputable and universally recognized. But he who would assert that abortive poliomyelitis is contagious must first prove that frank poliomyelitis is also, if his analogies are to hold at all. For all these reasons a study of frank poliomyelitis appeals to me as alone offering to lead surely or logically to the basis for correct conclusions.

SUSCEPTIBILITY

The scattering locality distribution of the cases in poliomyelitis outbreaks, and the occurrence of single cases in families or institutions where it would appear that all the individuals must be equally exposed to the same general conditions, give rise to a very natural belief in individual susceptibility as a strong factor in its prevalence and distribution. I have attempted to estimate the susceptibility of different ages and both sexes (Table 5). It must be remembered, however, that by offering variations in individual susceptibility as an ex-

planation, almost any peculiarity in the incidence of almost any infection may readily be dismissed—and such dismissal would in the best known diseases be largely at fault. Apart from immunity, acquired naturally or artificially the susceptibility of the great mass of a given population to the ordinary infectious diseases has not been shown to vary individually within the usual age-sex groups so greatly as to seriously disturb epidemiologic calculations relating to exposure to infection. In other words, the incidence of our ordinary infections depends more on exposure to infection than to individual natural immunity, although both are factors. Hence if it can be shown that susceptibility to poliomyelitis is not peculiar to age, sex, locality or other general conditions, or if a reasonable explanation may be offered to account for, as a matter of exposure, the incidence which otherwise must appear as wholly a matter of susceptibility, such a hypothesis is not unworthy of consideration.

It is quite true that a conception of the epidemiology of poliomyelitis may be formulated, regarding it as an extremely wide-spread but usually extremely mild and evanescent disease, highly transmissible, but usually overlooked or attributable to something else, because of its transitory and unidentifiable symptoms; that this mild and ordinarily quite neglible disease may at times, through the hypersusceptibility of individuals, under unusual conditions as yet unknown, develop in a very small proportion of the total persons attacked a severe form, to which alone attention is likely to be directed and which alone shows symptoms permitting differentiation. An analogous hypothesis has been advanced to account for the endemic existence of diphtheria, scarlet fever and typhoid fever; has been proved for malaria in the tropics, and practically proved for yellow fever. The wide-spread infection of the general population with the pneumococcus, resulting in pneumonia, however, only

when the "vitality" of the infected person is strongly "depressed" by fatigue, with sudden changes from warm to cold, especially damp cold, has been offered as affording an analogy for poliomyelitis, except that fatigue, with excessive heat and dryness, seem to be the controlling adjuvant conditions for the latter. The high potential infectiveness of pneumonia, contrasting with its usual lack of actual contagiousness, but realized occasionally in sweeping outbreaks, offers some attractive hypothetical analogies applicable, at least superficially, to explain the incidence of poliomyelitis. Against applying this hypothesis to poliomyelitis are a number of arguments, inconclusive singly, it is true, yet collectively strong. These are:

1. The small and inconclusive proof that frank human poliomyelitis gives rise to frank human poliomyelitis.

2. The fairly high, not low, susceptibility of the ages which are chiefly attacked; not, however, as great as for diphtheria or scarlet fever (see comparative attacks, poliomyelitis, diphtheria, scarlet fever, Tables 6 and 7).

3. The absence of any history of wide-spread, contagious but mild and undefined disease among children in years previous to epidemic outbreaks of poliomyelitis, or coincident with them. Even a most liberal estimate of the alleged abortive cases of poliomyelitis would not yield a percentage of attack as great as 0.5 per cent of the population.

4. The fact that the conception of this explanation for endemic typhoid, diphtheria or scarlet fever does not fit wholly with epidemiologic facts or the results of epidemiologic therapeutic measures—in brief, epidemiology finds that if the frank cases of the ordinary infections be recognized, reported faithfully, and promptly dealt with, the abortive case is not serious enough a factor to prevent the suppression of outbreaks and large reduction in cases, even if a residual remnant be thus maintained.

5. The fact that the "epidemiologic therapeutics," so far most successful in cutting short poliomyelitis outbreaks, ignores the contagion factor and relates wholly to another factor (dust) to be discussed further on.

6. The offered analogy with pneumonia is hardly a good parallel. It must be remembered that pneumonia is perhaps

TABLE 1.—BASIC DATA REQUIRED (CASES OF POLIOMYELITIS WITH PARALISIS ALONE CONSIDERED)*

Ages in Years.	Total Well, Males.	Total Well, Females.	Total Sick, Males.	Total Sick, Females.	Total Deaths, Males.	Total Deaths, Females.	Total Secondary, Males.	Total Secondary, Females.
Not given.....	102	86	5	2	2	0	1	1
Under one.....	16	13	10	11	4	4	2	1
One	13	13	16	12	3	2	1	0
Two	21	15	22	18	2	2	2	0
Three	17	17	22	14	3	0	5	1
Four	18	19	19	13	5	1	4	5
Five	14	10	13	9	1	1	3	0
One to five.....	83	74	92	66	14	6	15	6
Six	15	13	12	12	3	6	1	1
Seven	16	13	8	8	1	1	0	1
Eight	12	9	7	6	0	0	2	1
Nine	12	11	7	6	2	0	1	1
Ten	20	10	6	5	2	2	1	1
Six to ten.....	75	56	40	37	8	9	5	5
Eleven	6	7	1	2	0	1	0	0
Twelve	14	8	8	2	2	1	1	0
Thirteen	7	9	3	1	0	0	1	0
Fourteen	6	9	3	3	2	1	0	0
Fifteen	6	3	2	0	0	0	0	0
Eleven to fifteen.....	39	36	17	8	4	3	2	0
Sixteen	11	13	5	2	3	1	0	0
Seventeen	5	4	2	1	0	1	0	0
Eighteen	6	14	1	2	0	0	0	0
Nineteen	7	4	5	2	3	0	0	0
Twenty	3	4	1	0	0	0	0	0
Sixteen to twenty....	32	39	14	7	6	2	0	0
Adults	333	353	15	8	6	3	1	2
Totals	680	657	193	139	44	27	26	15

Total well, 1,337; total sick, 333†; total deaths, 71; total secondary, 41.

* The 102 well male children and 86 well female children for whom ages are not given, are distributed in the calculated attack rates and other tables following in the different age groups of children in the proportions which the children whose ages are given show. The adult figures are unaffected. The rates, if calculated without this allowance, would be uniformly about 20 per cent. too high.

The 5 sick males and 2 sick females whose ages are not given obviously cannot be thus treated; they are included in the totals, however. The chances are in favor of the majority of them belonging to the groups 1-5 and 6-10 years, and their introduction or omission would alter the total results by not more than 2.5 per cent. of that total.

† No sex given in one case.

the most wide-spread of the serious infections (except the venereal), eclipsing even tuberculosis in the deaths it contributes, while poliomyelitis, although widely scattered, contributes a total morbidity and mortality very low in comparison. Again, it would be hard to conceive of a wide-spread infection with the infective agent of poliomyelitis extending over many years past, without a corresponding incidence of the disease, and were the infective agent present almost universally in the human race, every drouth should precipitate an attack in all communities everywhere, if the analogy with pneumonia is to be carried out. (Pneumonia is precipitated of course by converse meteorologic conditions.) Finally, even if wide-spread infection with the poliomyelitis agent is now the explanation of its incidence, the spread of that agent must have been recent and would form the crucial point of this inquiry, thus bringing the investigator back to the original point.

It has been suggested that an unrecognized form of this disease may have existed as outlined above, but among lower animals, particularly perhaps among horses; that animal carriers, abortive cases and even frank cases unrecognized, among animals, may be the chief initial distributors. Evidence to make investigation of this possible source very well worth while exists, and I offer it as a reasonable alternative, explaining much now left unexplained by existing hypotheses, and above all furnishing a practical method of suppressing outbreaks, apparently successful so far, in each instance where it has been efficiently tried. That there is nothing really new in this hypothesis may relieve me from the imputation of a purely visionary outlook.

Table 1 gives the required data for a statistical inquiry regarding the chief epidemiologic characteristics of a disease. In Table 2 it is shown that 292 families, containing 1,670 members, an average of 5.7 members per family, presented 292 initial cases. In 257 families no further case occurred, but in 35 families the initial case was followed by others, whether occurring on the same day or later.

TABLE 2.—FAMILY DISTRIBUTION OF CASES

Families With	No. Families.	Initial Cases.	Subsequent Cases.	Total Cases.
One case	257	257	0	257
Two cases	30	30	30	60
Three cases	4	4	8	12
Four cases	1	1	3	4
Totals	292	292	41	333

That the summer and especially the fall of 1909 in Minnesota were extremely dry and dusty is well known. In the cases that I personally investigated the patients were all exposed to such dust, although a number of cases was reported when the weather was wet. The sharp fall of cases in November can be accounted for by the cold and wet, soon becoming snow, while I offer to account for the still continued scattering cases the hypothesis that if animal manure in the dust be the source, manure may be tracked into the houses, especially in the country, during the winter.

A confirmation of the dust hypothesis is found in my own observation of the success of a form of epidemiologic therapeusis attempted in Winona. Finding about twenty-nine cases there occurring up to the end of July, twenty-seven of which were on dusty streets, the local health officer, Dr. Donald B. Pritchard, and myself prepared a map and urged on the city council the experience of Eau Claire (Wis.), where the previous year watering of the streets had coincided with the end of the outbreak. On August 5 the watering began and no case developed after August 12, although the great incidence throughout the state had yet to develop, and the neighborhood outside of Winona continued to show cases. Three instances of this artificial therapeutic action are Eau Claire and New Richmond, Wis., and Winona, Minn., while it has long been noted that wet weather checks outbreaks.

In 234 cases only were intelligible records of previous local conditions as to rainfall available. In 188, previous weather conditions were reported as dry, 40 as wet, 6 as snowy. For reasons already discussed

TABLE 3.—TIME DISTRIBUTION OF 325 (CHIEFLY RURAL) CASES IN MINNESOTA

1900.												1910.
Jan.	Feb.	March.	April.	May.	June.	July.	August.	Sept.	Oct.	Nov.	Dec.	Jan.
2	1	2	0	1	7	26	58	99	87	21	10	11
	Precipitation					3.84	4.54	3.16	1.56	2.68	1.54	
	Departure from normal.....					—.48	÷1.15	—0.25	—0.82	÷1.83	÷0.77	
						— 11%	÷33%	—8%	—34%	÷200% i. e., 3 times normal	÷100% 2 times normal	

the relation between precipitation and dust is not readily ascertained, and these figures are not worth much, although the general relations to precipitation are suggestive. The time distribution corresponds also with the heavy development of the fly population, which was notably excessive in 1909. Flies would not, however, fit into the apparent fact that dust-laying rain or watering the streets seem to remove an essential factor. Flies could in any case be held responsible chiefly as carriers, and there seems to be no obvious reason why flies should not carry the disease in humid as well as in dry weather. It is not unlikely that flies do play a part, but probably a very subordinate part, in the spread of the disease.

That the schools act as distributors might at first sight seem demonstrated by the rise in the school months. But this rise began before the schools opened (August) and the outbreak stopped abruptly while the schools were in full swing (November). The heavy incidence of the disease is between 1 and 5 years; *i. e.,* before the school age.

That older children should bring the disease home without suffering themselves might be true, but again only in school time; against this are the facts that one-fourth of the total cases occurred in July and August, and that the age incidence of the cases after the schools opened did not materially change from the incidence in July. In brief, the older children did not go to school and bring the disease home to the younger children, but they received the disease themselves during this period. Moreover, although there was a rise in cases when the schools were opened in September, there was a sharp fall at the third week in October, maintained for the rest of the winter, and the first and the second ten-day periods in September showed only one-sixth more cases that the last ten days in August. In no school month

were the August cases as much as doubled, in spite of the fact that contact among the children in school months was many times multiplied. It is true that September and October each showed about the same number of cases as developed in the three vacation months together, but November showed less than July, and December but three cases more than June.

TABLE 4.—POLIOMYELITIS CASES PER UNIT OF POPULATION IN MINNESOTA

St. Paul	1.0 per 1,000
Minneapolis	0.1 per 1,000
Winona	1.7 per 1,000
State in general (rough estimate)	0.4 per 1,000

This table, like those for Massachusetts, indicates that there is no relation to density of population. Minneapolis and St. Paul are nearly of the same population, their centers of population about ten miles apart, their suburbs contiguous. Nevertheless one city had an incidence ten times as extensive as the other. This was made the subject of a personal investigation by me, resulting in establishing the facts, but yielding no satisfactory explanation. Should poliomyelitis be prevalent again this year it will be interesting to note if the incidence reverses, as it would seem from the literature that it is prone to do in consecutive years.

The incidence per thousand of population for each of the 150 or more localities from which the tabulated cases come has not been worked out in detail, nor is it of much moment, as the lack of relation between incidence and density of population has long been well established, and the figures of Table 4 show that this outbreak is no exception.

Over 150 separate localities in the state were affected, the number of cases in each varying from 250 to 1. A large number of places reported but a single case.

No relation to nationality was discovered. With an incidence of 50 per cent. among children from 1 to 5

TABLE 5.—CRUDE ATTACK RATES (CASES OF POLIOMYELITIS WITH PARALYSIS ALONE CONSIDERED)

Age in Years.	Total Persons Not Sick in Affected Families.			Total Sick Persons in Affected Families.			Crude Attack Rates.		
	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.
Not given	102	86	188	5	2	7	..	..	..
Under one	16	13	29	10	11	21	28	37	34
One to five	83	74	157	92	66	158	42	38	40
Six to ten	75	56	131	40	37	77	28	32	30
Eleven to fifteen	39	36	75	17	8	25	24	15	20
Sixteen to twenty	32	39	71	14	7	21	24	12	18
Adults	333	353	686	15	8	23	4.3	2.2	3.3
Totals	680	657	1,337	193	139	333*	22	17	20

Ages.	Diphtheria. Crude attack rates.		Scarlet fever. Crude attack rates	
	Male.	Female.	Male.	Female.
Under one	15.7	14.9	15	9
One to five	53	53	55	55
Six to ten	49	52	55	60
Eleven to fifteen	26	33	29	41
Sixteen to twenty	18	22	14	17
Adults	5.3	10	4.9	4.8
Totals	24.9	27.6	26.5	28.9

* In one case no sex was given, and it appears only in this total.

years old it will readily be seen that the majority of cases were Minnesota-born. The prevailing nationalities of the parents correspond with the prevailing nationalties in the affected localities; no ethnologic relationship was discovered.

The age and sex distribution of the cases is not of final value without the age and sex distribution of the general population in the localities concerned. Comparison with the age and sex distribution of the whole state would be of little significance, for after all the total incidence in the state was under 0.05 per cent, and the figures for nearly two-thirds of the incidence are not available at present. Failing this, the table shows the age and sex distribution of the cases as against the age and sex distribution of the total membership of the affected families. This is the basis of Chapin's tables for diphtheria and scarlet fever.

The crude attack rates are obtained by taking the total persons sick, adding them to the total persons well (thus obtaining the total membership of the affected families), and calculating the total sick as a percentage of the total membership. The above table gives these figures for each sex-age group as well as for the totals.

Note that the incidence is particularly in the age group from 1 to 5 years; that up to 10 years there is no great discrepancy between the rates for males and females; that above 10 years the rates for males continue high, the rates for females dropping very appreciably in comparison.

Comparing these rates with those for diphtheria and scarlet fever the poliomyelitis rate shows much higher under 1 year, but decidedly lower for the years showing the bulk of the cases, from 1 to 5 years and from 6 to 10 years.

In all these diseases males and females are attacked in nearly the same proportion in these two age groups, but

for diphtheria and scarlet fever the females of the higher age groups are attacked in excess of the males, while, as already pointed out, the reverse is true of poliomyelitis.

So far as crude attack rates show susceptibility these figures would indicate little sex distinction in susceptibility below 10 years. The decided difference in incidence above this age may be attributed to a sudden change in susceptibility as the children grow older—the females developing immunity more than males in poliomyelitis; less than males in diphtheria and scarlet fever; this immunity being age-immunity, not the result of a previous attack, for it cannot be believed that in poliomyelitis older persons of to-day are relatively immune from attacks earlier in life (unless indeed this disease in a wide-spread but exceedingly light and wholly unrecognized form has existed for indefinite past years); in diphtheria the immunity conveyed by a previous attack is not great nor lasting, and in scarlet fever the figures given were obtained after specifically eliminating from the calculations all persons immunized by a previous attack. That age-immunity exists is evident, but since the factors of age-immunity itself are unknown it is idle to speculate on the factors of assumed age or sex variations in such immunity. Moreover, it seems uncalled for, even, to assume that sex variations in age-immunity exist at all, if a simpler and more obvious explanation can be found.

In diphtheria and scarlet fever the greater incidence in females as compared with males at the older ages is explained by the readily conceded fact that females of these ages are more exposed to infection than males of the same ages, because they do the nursing of the sick ones, while the males keep out of the sick-room or even leave the house entirely for a time. It is notable that the decided difference in incidence between males and females begins at the age when helping about the house,

and especially helping to take care of the younger children, begins to be an important part of the girl's life. There is then no reason to believe for these two diseases that any more real difference of susceptibility between males and females exists at the higher ages than at the lower, *i. e.*, there is reason to believe that if the males of these ages were as much exposed as the females they would show an equal or nearly equal incidence.

In poliomyelitis, although the nursing of the cases fell as usual to the older girls and adult women, the older males did not make the effort to keep away from the patients which are made in this country more or less for scarlet fever and diphtheria everywhere, and especially it must be assumed in Providence, R. I., from the experience of which city the diphtheria and scarlet fever tables are compiled. Hence it would be reasonable to expect that the poliomyelitis rates for males and females at the older ages would run more closely together than for diphtheria or scarlet fever. As a matter of fact, however, the discrepancy is not only greater, but is reversed. Hence we must believe either that the immunity of the females suddenly rises over that of males in poliomyelitis at the ages wherein, if there is any difference, if it falls in the other diseases, or that the danger from exposure to poliomyelitis is much less. In brief, if poliomyelitis be markedly contagious from human being to human being, why should the age and sex groups peculiarly exposed to it be the very groups which peculiarly escape? If, however, poliomyelitis is little contracted from previous human cases, and chiefly from some outside factor, the reversal of the incidence at these ages is readily understood; *i. e.*, the females remain at home, comparatively safe; the males go abroad, encounter the infection and contract the disease. This hypothesis accounts also for the great bulk of the cases occur-

TABLE 6.—PRIMARY AND SECONDARY RATES WITH RATIOS, POLIOMYELITIS, DIPHTHERIA, SCARLET FEVER

Ages in years.	Poliomyelitis. Primary rates.		Poliomyelitis. Secondary rates.		Diphtheria. Primary rates.		Diphtheria. Secondary rates.		Scarlet fever. Primary rates.		Scarlet fever. Secondary rates.	
	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.
Under 1	24	33	9	5.6	8	8.4	8.2	7.1	11	4.3	4.9	5.2
1 to 5	35	34	12	6	36	33	27	30	41	39	30	27
6 to 10	24	27	5	6.5	33	37	18	22	40	44	24	27
11 to 15	22	16	3.7	0	17	22	10	14	22	30	9	17
16 to 20	24	12	0	0	13	14	6	9	10	12	4	6
Adults	4	1.6	.3	.6	3.6	5.8	1.8	4.9	2	3	7	1.7

Ages in yrs.	Poliomyelitis. Ratio primary to secondary rates. Male.	Poliomyelitis. Ratio primary to secondary rates. Female.	Diphtheria. Ratio primary to secondary rates. Male.	Diphtheria. Ratio primary to secondary rates. Female.	Scarlet fever. Ratio primary to secondary rates. Male.	Scarlet fever. Ratio primary to secondary rates. Female.
Under 1..	37	17	102.5	84	44	121
1 to 5...	34	18	75	91	73	70
6 to 10..	21	24	54	59	60	61
11 to 15.	17	..	60	64	41	56
16 to 20.	..	..	46	64	40	50
Adults ...	7.5	37	50	84	23	56

ring at the earlier ages of males and females, and in almost the same proportion. At these ages there is little sex-distinction in the lives of boys and girls as they play together in the yard or on the street. Later the sex-differentiation in life takes the girls into the home, leaves the boy on the street or at work, etc.

Table 6 contrasts with Table 5 in that the latter gives the crude attack rates, *i. e.*, indicates the total incidence on the males and females of the different age-groups in proportion to the numbers of each age and sex present in the affected families, while Table 6 gives the division of the incidence into, first, that resulting from (hypothetical in the case of poliomyelitis) outside infection (primary rates) and that resulting from (hypothetical in the case of poliomyelitis) infection within the family; *i. e.*, from the primary or initial case in that family to the other members.

For comparison with the poliomyelitis section of the table, similarly constructed sections from Chapin for diphtheria and scarlet fever are given. In these two diseases the source of infection is well known and in the primary cases the patients really were infected outside the family (in most instances), and in the secondary cases the patients really were infected from the primary case (in most instances). It is true that in the diphtheria and scarlet fever sections the amount of error, due to apparent secondary cases really receiving their infection from the same source as the primary case, is unknown. To give comparative results apparent secondary cases of poliomyelitis have likewise been left undivided as regards true secondary cases and secondaries only in appearance. The fact that this involves inaccuracy should be remembered. The incubation period of poliomyelitis derived by various authorities ranges from 1 to 7 days, with 3 to 5 as the most usual. About 10 per cent. of the cases listed above as secondary would be rejected because they occurred on the same day as the

"primary" case (males under 1=1; 1-5 yrs.=1; females, 1-5 yrs.=2). This would cut the secondary rate for males under 1 in two and reduce the female secondary rate (1 to 5 years) by one-third. Further, admitting seven days as the greatest possible incubation period, fully one-half of the above-assumed secondaries might have derived their infection from the same source as the case to which they were apparently secondary. Hence the cases here treated as secondaries are so treated on very inconclusive evidence. The hypothesis that poliomyelitis is contagious from human being to human being has been allowed, therefore, the full benefits of all the doubts.

The rates for diphtheria and scarlet fever, and especially the ratios of these primary and secondary rates to each other, are very ragged under 1 year. For the ages from 1 to 5 and from 6 to 10 years the primary rates for diphtheria are nearly the same for both ages, and the secondary rates, although somewhat lower than the primary, show no great sex difference. At the ages above 10, however, the primary rates, although somewhat higher for females than males, do not show as much excess as do the secondary rates, which for the three age groups, from 11 to 15, from 16 to 20, and adults, are respectively 40 per cent., 50 per cent. and over 200 per cent. greater for females than for males.

For scarlet fever the same general relationships are also true. In poliomyelitis, however, the secondary rates are much lower than the primary rates at all ages, and the female secondary rates disappear entirely in the age groups from 11 to 15 and from 16 to 20. In adult females the secondary rate is twice that of males, and the ratio of secondary to primary cases is exceedingly high. But this is based on extremely small figures (two cases out of a total of eight) and is in all probability a freak result.

These figures, then, so far as their face value goes, support and confirm the deductions from the crude attack rates already given. The small number of secondary cases in poliomyelitis, while proving the low infectiveness of the disease (at least so far as frank cases giving rise to frank cases is concerned), makes a detailed comparison of rates with diphtheria and scarlet fever rather farcical. Suffice it to say that in so far as the figures have any value they show a remarkable lack of parallelism between poliomyelitis and these two diseases.

If the hypothesis that poliomyelitis is contagious be maintained, and judging alone from the number of cases developed in families after the first case, poliomyelitis is about one-fourth as likely to be conveyed as diphtheria and about one-third as likely to be conveyed as scarlet fever.

If the abortive cases reported as secondary be added to the other secondary cases already given, 60 per cent. must be added to the attack rates. This would still leave the disease less than one-half as contagious as diphtheria and about one-half as contagious as scarlet fever, not allowing for the fact that both the diphtheria and scarlet fever rates would go up also if abortive cases of these diseases were added to their totals.

TABLE 7.—RELATIVE NUMBER OF SECONDARY CASES TO PRIMARY CASES IN POLIOMYELITIS, DIPHTHERIA, SCARLET FEVER

	Poliomyelitis.		Diphtheria.		Scarlet fever.	
Ages in years.	Male.	Female.	Male.	Female.	Male.	Female.
Under 1 to 10.	18	12	44	48	45	38
11 to 20.....	7	0	48	52	33	40
Adults	7	33*	48	88	23	54
Total percentage for each sex	16	12	45	54	41	39
Total percentage for each disease	14		50		40	

* This figure was based on 2 cases secondary out of a total of eight cases, and is therefore very unreliable.

The percentage of secondary cases to primary cases is of interest as showing the relative spread of the disease

from outside sources and within families as compared with the similar spread of diphtheria and scarlet fever.

The total figures are especially instructive. In diphtheria, despite precautions taken within the family, isolation and disinfection, the secondary cases are half as numerous as the primary, and in scarlet fever not much less. In poliomyelitis, however, the secondaries are about one-seventh as numerous as the primaries, showing a relatively much greater development from outside sources, and this despite the fact that in poliomyelitis isolation within the family (internal isolation), disinfection, etc., were practically non-existent.

Typhoid fever under excellent surveillance within Mankato showed a percentage of secondaries to primaries of 10 per cent. assured secondaries, or 17 per cent., including some doubtful cases. Where such surveillance was not carried out, the percentage of secondaries to primaries was 27 per cent. In Washington this figure as given in the Third Report on Typhoid Fever is 25 per cent. (*i. e.*, 20 per cent. of all cases were secondary.)

TABLE 8.—DISTRIBUTION OF DEATHS BY FAMILIES FOR 333 CASES (CASES OF POLIOMYELITIS WITH PARALYSIS ALONE CONSIDERED)

Families with:	Total families.	Families.	Cases.	Deaths.
1 case	257	203	203	0
		54	54	54
2 cases	30	18	36	0
		11	22	11
		1	2	2
3 cases	4	3	9	0
		1	3	1
4 cases	1	1	4	3
Totals	292	292	333	71

The thirty-five families having two or more cases formed 12 per cent. of the total families, but showed seventeen deaths, or 24 per cent. of the total deaths. While 26 per cent. of the one-case families showed a death, 40 per cent. of the multiple-case families furnished one or more deaths. It has been suggested that families with more than one case are particularly likely to show deaths because of increased concentration of the

TABLE 9.—CASE RATE OR FATALITY FOR 325 CASES (PARALYZED CASES OF POLIOMYELITIS ALONE CONSIDERED)

	Poliomyelitis									Totality.	
	Cases.			Deaths.			Fatality.				
Ages in years.	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.	Diph.	S. fever.
Under 1.....	10	11	21	4	4	8	40	36	38	38	18
1 to 5.....	92	66	158	14	6	20	15	9	12	29	14
6 to 10.....	40	37	77	8	9	17	20	24	22	12	5.7
11 to 15.....	17	8	25	4	3	7	23	37	28	5.1	3.5
16 to 20.....	14	7	21	6	2	8	43	29	38	4.8	4.2
Adults	15	8	23	6	3	9	40	37	39	2.8	6
Totals	188	137	325	42	27	69	22	20	21	15.5	8.3

poison in that family, a family susceptibility, overwhelming exposure to infection, etc. This seems to be supported by three deaths in one four-case family. On the other hand, the thirty-five multiple-case families contained 23 per cent. of the total cases and showed 24 per cent. of the total deaths, evidencing therefore no great tendency to lose more than the proportion lost by the others. The 30 families having 2 cases per family lost 13 cases, or nearly one to every 2 families, while 257 families having 1 case each lost 54 cases, or about 1 to every 5 families. Had these 257 cases been in 128 families instead of 257, and suffered deaths at 13 cases per 30 families (the 2-case family rate), they would have lost 55 cases instead of 54. Had the 60 cases in 30 families occurred as in 60 families, with a death-rate of 54 cases per 257 families (the 1-case family rate), they would have lost 12 and a fraction cases instead of 13. Hence the death rates are not really greatly affected by the existence of multiple cases.

Perhaps next to the questions of abortive cases and of contagiousness the fatality of poliomyelitis (*i. e.*, the percentage of deaths to cases) is the most mooted point. This depends on the question of abortive cases, already discussed, for, while the deaths are fairly well known, the cases vary in number entirely with the opinion as to abortive cases of the reporting physician. In the outbreak of fifty-six cases already referred to (largely follicular tonsillitis, in my opinion), the death-rate would have varied from 40 per cent. on the basis of my view to less than 3 per cent. in the view taken by the attending physician. In the above table paralyzed cases only are considered.

The most interesting features are:

1. **The reasonable correspondence of the total fatality of males and females in poliomyelitis at different ages, together with the decidedly lower rate for females in the age group whence the bulk of the cases come.**

2. The great height of the fatality of poliomyelitis at the extreme age-groups ("children under 1" and "adult"), which, however, supply but a small part of the total cases.

3. The comparatively low fatality of poliomyelitis in the age-group which supplies the bulk of the cases (1 to 5 years).

4. The divergencies of the mortality of poliomyelitis from that of diphtheria and of scarlet fever, the two best known infectious diseases of children.

In diphtheria and scarlet fever children under 1 give the highest fatality, in this paralleling poliomyelitis, except that in poliomyelitis adults reach the same point; the next group, 1 to 5 years, in diphtheria and scarlet fever, yield the next highest fatality, but in poliomyelitis the lowest of all. Thereafter in diphtheria and scarlet fever the fatality falls as the ages increase, while in poliomyelitis exactly the reverse is true, the fatality rising as the ages rise. The total fatality of poliomyelitis is about 133 per cent. of the diphtheria fatality and 250 per cent. of the scarlet fever fatality.

TABLE 10.—INTERVALS BETWEEN INITIAL AND SUBSEQUENT CASES IN FAMILIES HAVING MORE THAN ONE CASE

	Apparent secondaries showing these intervals.		
Intervals. Days.	Males.	Females.	Total
0	2	2	4
1	1	1	2
2	1	1	2
3	3	2	5
4	1	0	1
5	1	1	2
6	2	2	4
7	3	1	4
8	1	2	3
9	2	2	4
11	1	0	1
14	0	1	1
17	1	0	1
21	1	0	1
24	1	0	1
Not given	..	..	5
			41

These intervals afford little light on the question of incubation periods, because as a rule in the assumed secondary case the patient was in contact with the patient in its primary case up to the date of becoming ill, and

hypothetically might have contracted the disease from the primary at any time up to that date. For instance, in the case above listed as showing a twenty-four-day interval the patient in the primary case recovered and so might have acted as infector at any time during the attack to its end, or even during convalescence. On the other hand, in the case above listed as showing a twenty-one-day interval, the patient in the primary case died ten days before the secondary case developed. Hence the incubation period in this case (assuming the living patient in the primary case as the infector) could not be less than ten days. Assuming the infection to be derived from the patient in the primary case after death, the incubation period could not exceed from seven to nine days.

As elsewhere pointed out, if the incubation period advocated by some authors of from one to seven days be adopted, the infection of all secondary cases showing onset of six days' interval or less from the onset of their respective primary cases may be attributed with equally good reason to the same cource which gave rise to the primary case as to the primary case itself, and the shorter the interval the greater the likelihood of a common source. In typhoid fever, where the cause of the primary cases in families is usually (in large outbreaks at least) some source other than direct contact (water, milk, etc.), the assumption made for poliomyelitis throughout this paper, that all multiple cases in families except the first are derived by infection from that first, would be in error. In the Mankato epidemic of 1908, which I personally studied in detail, this assumption would have attributed 96 cases to secondary infection, whereas careful investigation of all the factors and close comparison of dates, showed only 32 cases as assured secondaries, with 15 more for which the evidence was not conclusive. Hence the assured secondaries were but one-third of the assumed secondaries. There is as yet no

way of arriving at the proper similar discount for poliomyelitis, but it will be seen that 10 per cent. of the assumed secondaries developed on the same day as their assumed primaries, and that over one-half occurred at dates close enough to the dates of the assumed primaries to make their standing as true secondaries very uncertain. The only satisfactory evidence for fixing incubation periods is derived from cases exposed to the source of infection for one day only; hence they can rarely be determined from cases occurring in the same family.

TABLE 11.—THE DAY OF THE DISEASE ON WHICH PARALYSIS OCCURRED (269 CASES)

Day.	
1st, i. e., day of onset	11 per cent.
2nd	10 per cent.
3rd	18 per cent.
4th	21 per cent.
5th	11 per cent.
6th	9 per cent.

About 80 per cent. of the paralyses occurred on or before the sixth day, about 50 per cent. on or before the fourth day, between 98 and 99 per cent. by the sixteenth day, although in 1 case it occurred on the twenty-fourth and in 1 on the twenty-seventh day.

TABLE 12.—OUTCOME OF 283 CASES

None of these cases had existed longer than one year, and the great majority not more than six months.

Partial recovery	60 per cent.
Complete recovery	15 per cent.
Survival but no improvement	1 per cent.
Deaths	24 per cent.

TABLE 13.—QUANTITATIVE CLINICAL CHARACTERISTICS

Fever was reported in	95 per cent.	of 278 cases
Headache and pain in	87 per cent.	of 246 cases
Tenderness in	85 per cent.	of 237 cases
Constipation in	72 per cent.	of 276 cases
Vomiting in	66 per cent.	of 275 cases
Retraction of head in	46 per cent.	of 270 cases
Sore throat in	26 per cent.	of 270 cases

This is interesting as indicating the incidence of symptoms as observed by physicians, and fails to justify wholly some of the published clinical accounts. The very low percentage of sore throat and the high percentage of constipation contrasts, especially the former,

with the descriptions of the disease given by Scandinavian authorities. Inasmuch as both sore throat and contagiousness were insisted on by the Scandinavian authorities, and neither sore throat nor contagiousness were strongly in evidence in the Minnesota outbreaks, in a former communication I suggested the possible existence of a sore-throat contagious form and a form without sore throat, relatively non-contagious. It is rather obvious that any infectious disease in which the infective agent produced in the throat an appreciable lesion would be more liable to ready transmission of the infective agent than a disease where the infective agent was confined to the tissues or even the intestine (compare the relative contagiousness of scarlet fever, diphtheria, etc., with that of typhoid fever or non-pulmonary tuberculosis).

A search of the Minnesota records failed to show that even alleged secondaries were any more abundant, following sore-throat cases, than where no sore throats existed. Hence this hypothetical correlation was not confirmed by the figures available here.

The retraction of the head, also so often looked on as a prominent symptom, would seem to have escaped notice in over half the cases. On the other hand, headache, pain and tenderness are probably more constant than would appear from the above, since in young children their detection is not always easy.

TABLE 14.—RELATION OF CONSTIPATION TO SORE THROAT IN 287 CASES *

Constipation.	Sore throat.	Cases.
Present	Present	62
Present	Not present	149
Not present	Not present	63
Not present	Present	13

* Seventeen cases are included here not included in previous tables.

Hence in 211 cases or 73 per cent. of the total, constipation was present; in 62 or 30 per cent. of these constipated cases sore throat was present.

Of the 76 non-constipated patients (a very few of whom only were recorded as showing diarrhea), about 16 per cent. showed sore throat.

On the face of the returns, therefore, sore throats were found in about 25 per cent. only of the total cases, and in about 84 per cent. of the sore-throat cases the patient was constipated. It would seem that sore throat was rather a concomitant of the intestinal disturbance than an essential feature of the disease.

TABLE 15.—GENERAL TYPE OF FAMILY AND PATIENT

Of 257 families, 5 per cent. were described as rich, 25 per cent. as poor, 70 per cent. as medium.
Of 258 families, 95 per cent. were described as of good previous health.
Of 285 patients, 89 per cent. were described as of good previous health, 6 per cent. medium, 5 per cent. poor.
Of 280 patients, 85 per cent. were described as of good nutrition, 8 per cent. medium, 7 per cent. poor.
Of 257 patients, 44 per cent. had one or more of the diseases of children.

The type of family and patient attacked by the disease is of some interest, although again the quantitative figures are without much meaning, since the general numerical distribution of the same types in the state are not known.

The robustness and especially the activity of the children attacked impressed me in my work. Physicians report on 280 cases 82 per cent., both robust and active, 5 per cent. active, but not robust, 6 per cent. medium, 7 per cent. not robust or active, and 1 patient robust, but not active. Personal investigation showed that severe fatigue precedes the attack so often as to suggest some relation greater than coincidence. It seemed to me, in brief, that those persons who lived up fully to their nutritional income, however good that might be, were those particularly selected. It was curious to hear in family after family where one child out of a large number was affected, the same cry from the parents, "If it were anyone of the other children we would not have wondered, but why this one, the brightest, strongest, most active should get it, we cannot understand."

TABLE 16.—TIME RELATIONS OF DEATH TO ONSET OF DISEASE

Of 49 deaths:

3	occurred on the 3rd day of the attack.
11	occurred on the 4th day of the attack.
10	occurred on the 5th day of the attack.
8	occurred on the 6th day of the attack.
1	occurred on the 7th day of the attack.
1	occurred on the 8th day of the attack.
6	occurred on the 9th day of the attack.
4	occurred on the 10th day of the attack.
3	occurred on the 12th day of the attack.
1	occurred on the 37th day of starvation from throat affection.
1	occurred 5 months later of pneumonia.

In general the fatal cases were those of patients affected early, perhaps only, high in the cord or lower brain; and ascending cases. Half the deaths occurred within the first four days. Eighty per cent. of the deaths occurred within the first nine days. All occurred by the twelfth day, except one due to starvation and one due to pneumonia.

TABLE 17.—TIME RELATION OF DEATH TO PARALYSES

Of 49 deaths:

6	occurred on same day as onset of paralysis.
10	occurred on 2nd day after onset of paralysis.
12	occurred on 3rd day after onset of paralysis.
8	occurred on 4th day after onset of paralysis.
4	occurred on 5th day after onset of paralysis.
2	occurred on 6th day after onset of paralysis.
1	occurred on 7th day after onset of paralysis.
2	occurred on 8th day after onset of paralysis.
2	occurred on 10th day after onset of paralysis.
1	occurred on 37th day after onset of paralysis. (Starvation.)
1	occurred 5 months later. (Pneumonia.)

Thus over half the deaths occurred on or before the third day of paralysis, 80 per cent. on or before the fifth day of paralysis. No patient died after the tenth day of paralysis, except two from incidental causes.

TABLE 18.—INDICATING ALLEGED HUMAN SOURCES OF INFECTION FOR PRIMARY CASES

Total primary cases	292
Attributed to direct contact with other cases	2
Through a third party	5
Attending school where other cases developed	3
Playing with children then well, but later taken sick	4
Other children sick in neighborhood	6
Apartments connected with other apartments, child sick	1
	21
Not connected by history with previous cases	271

Heretofore in this communication the epidemiology of secondary cases has been chiefly discussed. Table 18 indicates the human sources of contagion available to the primary cases as reported by physicians. In my own investigations covering 69 primary cases, no instance of direct contagion from frank or even alleged abortive cases could be had, and remote histories of indirect contact were almost as rare. In brief, the evidence which was offered to show that specific primary cases were derived from other human cases would not be accepted as conclusively explaining the source of a case of diphtheria or scarlet fever, although the contagiousness of these has been fully established. The hypothesis of human carriers as an alternative for frank cases as a source of contagion is far from satisfactory. The great incidence of cases is from 1 to 5 years, and in rural districts; hence not of the age or among the classes where great exposure to outside persons exists. The carrier hypothesis would mean in such instances that father or mother, or older children, must usually be the carriers—chiefly the fathers, for mothers and older children in the country do not roam much.

Transmission of scarlet fever or diphtheria, etc., by third parties is little counted on by epidemiologists, except when the carrier is in close and recent intimate contact with infector as well as infectee. Yet in almost every primary case of poliomyelitis seen by myself or reported by physicians, the hypothetical carrier must have obtained his hypothetical infection from yet another hypothetical carrier, for in the great majority of primary cases no other previous case was known to the families concerned.

CONCLUSIONS

With a full appreciation of the shortcomings of this investigation, and unable, for lack of data, to compare the results in detail with those of other outbreaks, I believe the following statements justifiable:

1. Frank human poliomyelitis is not spread by direct derivation from frank human poliomyelitis in a proportion of cases large enough to have serious epidemiological importance.

2. The majority of primary cases of frank human poliomyelitis show no history of contact with recognized abortive cases; that contact with unrecognized abortive human cases as a cause of spread is necessarily speculative merely; and that contact with human carriers (*i. e.*, well but infected persons), involves so circuitous a path, so incomparable with the known methods of transmission of frankly infectious diseases, and so difficult to use as an explanation of the high rural incidence, in children from 1 to 5 years old, as to be at present less probable than other hypotheses.

3. The high rural incidence in children may readily be explained by the dust hypothesis, which at the same time explains also the greater incidence, at older ages, in males than in females. The apparently established effect of dust-laying rainfall in cutting short poliomyelitis outbreaks indicates some other factor than infected human beings as the chief cause. No infectious disease, dependent for spread chiefly on human sources, is affected thus by such rainfall. (Typhoid fever has been attributed in India to dust. Dust is not a factor in its spread here, and if anything typhoid tends to increase in wet weather rather than in dry.)

4. The dust hypothesis gives a practical method of suppressing outbreaks (where extensive watering can be done) successful in each instance where it has been efficiently tried, and successful despite the fact that all other factors besides dust were ignored.

5. Admitting relation to outside or street dust, the dust *per se* can have no effect, except as a carrier of the infective agent. It seems impossible that this agent can be derived from the discharges of human beings, for conditions favorable to dust (dryness and sunlight) are un-

favorable to the persistence of living organisms in the only human discharges (*i. e.*, from nose and throat) which have wide distribution in such dust in the North. In the South, where other human discharges pollute the soil extensively, poliomyelitis has been less prevalent than in the North.

6. The intestinal discharges of horses are not only almost ubiquitous in street dust, but also on country roads and in the neighborhood of the most isolated farmhouses; they are sufficiently massive to protect imbedded organisms from direct sunlight and drying, yet pulverize readily, especially under heavy traffic, and may easily be blown about or tracked into houses almost perfectly fresh, particularly in rural communities.

7. Horses in general, especially farm horses, associate together on market days, etc., as much as do their owners, and transmission of infection from horse to horse all over the state is at least as likely as transmissions through humans.

8. A disease clinically like poliomyelitis has existed in colts in Minnesota for some years, and has been observed, though not recognized, by veterinarians all over the state and in North Dakota.

9. For all these reasons, and although there is as yet no final proof to be offered, the hypothesis of the horse as suffering from frank poliomyelitis, abortive poliomyelitis, or even as a carrier (i. e., well but infected), satisfies the known facts of poliomyelitis much better than do similar hypotheses concerning human cases or carriers.

10. Finally I appreciate fully the great errors made in the epidemiology of many diseases, notably in malaria and tuberculosis, previous to the discovery and minute painstaking demonstration step by step of the life histories of their respective infective agents; and therefore offer this material merely as supporting a reasonable hypothesis worthy of further investigation. It seems con-

sistent with the known facts, furnishes a heretofore successful epidemiologic therapeutic proceeding, and permits epidemiologic prognosis—hence would appear not an impossible solution.

I cannot refrain from pointing out, hopeless as it may be to do so, that poliomyelitis, undoubtedly serious, undoubtedly no inconsiderable burden to be borne, undoubtedly to be guarded against with all care, has nevertheless impressed the lay as well as the professional mind much out of proportion to its true importance.

Knowledge of it in its epidemic form is recent and not widespread; it is spectacular; it is much discussed; confessed ignorance of its source, its peculiar distribution, its selection of the strong and healthy, the disputes as to its contagiousness, have combined to throw an atmosphere of mystery and terror over it, justified somewhat by its high fatality and by the frequency of disability when recovery takes place.

A cool consideration of the deaths places poliomyelitis in this state on a par with whooping cough, makes it scarcely one-third as important as diphtheria, one-sixth as important as diarrheal diseases of children, yet panic-stricken people desire to take their children out of the country or refuse to enter the affected districts, and this despite the fact that the dangers to their children from at least half a dozen other diseases, equally to be encountered everywhere, is much greater; despite the fact that the chance of attack from poliomyelitis has been but one-tenth the chance of contracting diphtheria or scarlet fever; despite the fact that no disease of children except cerebrospinal meningitis can show fewer cases to its credit. Could we get one-half the public interest displayed in summer diarrhea that is forced on us by poliomyelitis we would be in a position to save three times the number of lives that are lost from poliomyelitis. But the public is taking the view, "if my child does not get poliomyelitis I do not care about the other things," to

such an extent that it is becoming difficult to secure action on these other diseases very much more important than poliomyelitis in deaths and total disabilities. It is high time for professional hygienists, and for physicians everywhere, to encourage a more cool-headed and rational view; to attribute to poliomyelitis its due share of attention, but to avoid the overattention resulting in worry and panic almost as harmful as the disease itself.

ABSTRACT OF DISCUSSION

DR. J. M. ALLEN, Liberty, Mo.: Does nationality play any part in etiology, in view of the fact that poliomyelitis is practically a new epidemic disease?

DR. W. FORREST DUTTON, Carnegie, Pa.: Dr. Hill, in comparing poliomyelitis and smallpox, calls typhoid a highly contagious disease. I have studied typhoid for some years, and I have the first time to find that it is a highly contagious disease. Perhaps he did not mean that; but I would like an explanation of his statement.

DR. SENECA EGBERT, Philadelphia: This question of the influence of the horse in relation to this disease may be a very important one. It seems to me that there is an analogy between this disease and tetanus in more ways than one; and I know that Dr. Hill will not let the veterinarian forget to follow up these points. If we are to regard this as a horse disease or as a stable disease, it will lead to the question, of course, as to what communication there is between the various animals that are affected, if they happen to find that there is an epidemic in the horses throughout the state, and it will possibly lead up to the question of the food of the horses to see, too, whether it comes from a certain locality. Dr. Hill has opened up several inquiries here that we all must admit are too new to be settled quickly; but it seems to me there is a big possibility for the future in them.

DR. JULIUS LINGENFELDER, St. Louis: A short time ago in the country I saw two cases of sickness in young dogs six or seven weeks old that very much resembled some cases of poliomyelitis I had previously seen in children. I could not make an examination; but at the very time I happened to be there, the lady of the house came in and told me there was another young dog in the barn beginning to be sick in the same way as the other two.

DR. H. W. HILL, Minneapolis: It seems independent of nationality. None of us is sure about contagion or infection; it may be contagious in a small degree or under peculiar cir-

cumstances. It cannot be very contagious, however; but because it may be contagious to even a slight extent in Minnesota, we officially insist on isolation, the disinfection of the discharges, and private funerals. Of course, typhoid fever is both potentially and actually contagious. I have six cases of typhoid fever out of one house where the cause resulting in the first case had ceased to act, but the people were very careless about the sanitary care of the patient. The contagiousness of typhoid fever is simply a matter of whether or not the attendants allow the discharges to get on their fingers and then put them in their mouths; that form of contagion is going on all the time in typhoid fever. About 20 to 30 per cent. of our typhoid is due to such contagion. It is curious that where trained nurses take care of cases, they usually escape, unless they are in the first three months of training; I personally believe that a hospital which permits a novice to nurse typhoid fever ought to be subject to suits for damages if she contracts it. I have seen such infection of green nurses so frequently in our state that it is simply appalling.

RELATION OF RECRUITING TO PREVENTIVE MEDICINE

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That old and trite saying that "the efficiency of an army or navy depends on the soundness of the health of the individuals composing it," was equally true in the past as in the present, when the study of preventive medicine is so much to the fore. To-day there is a deeper appreciation of the reality of this fact, and consequently the work of recruiting has assumed the serious rôle to which it is entitled.

"Since the most important factor in the efficiency of an army is its health, it follows that everything which may influence this in any way for the better or worse should be looked after with the utmost care. The men who compose an army are drawn from civil life, in which each individual has, to a greater or lesser extent, independent control of his time, choice of occupation, selection of food and dwelling-place, and general sanitary care. After enlistment, soldiers lose most of this independence; they are housed, clothed, fed and exercised under regulations which it is beyond their power to amend; they are moved from one point to another, differing perhaps very widely in climatic and other conditions, under orders which they may not presume to question; their hours for sleep, meals, work, and recreation are fixed for them without consultation with them, and without regard to individual or communal preference." [1] This applies with equal force to men-o'war's men.

1. Harrington: Practical Hygiene, p. 565.

The importance of the work of recruiting is more particularly emphasized when one considers the large percentage of rejections, 67 per cent., the few accepted, 33 per cent.; and of the latter, despite rules and regulations and utmost care, some must be discharged on the first re-examination on the receiving ship, the number surveyed each year not in the line of duty or existed prior to enlistment, besides the cost in time, labor and keep, lost to the government, and the hard fact that the physically undesirable recruit is filling the place otherwise occupied by a good man.

The life at sea is at times arduous, calling for stamina and unexpected demands at any hour of the day or night, for the man enlists for general service, for war as well as for peace, never forgetting that the question of the line of duty and pension may arise in each case.

The applicant, as he presents himself at the recruiting office, is not of a distinct and separate class; on the contrary, he represents all types and comes from all walks of life, from the highest to the lowest. He is the graduate in medicine, law, theology, the teacher, the pharmacist, the student, the actor, the artisan, the clerk, the laborer, the schoolboy, the gentleman hobo and the tramp; from nearly every field of human activity men seek entrance into the enlisted force of the United States Navy.

Among such a collection of potential men-o'-war's men are met all degrees of physical defects as well as physical perfection (so far as this is possible); all degrees of cleanliness of person and clothes; men with and without means of livelihood; the stupid and the mentally weak, ascending to the highly trained and educated; men of travel, men from home and the poor devils looking for a home, men of the city and men off the farm; those of unsavory reputation, the lovelorn and other runaways—in fact, there are no exceptions,

for all classes of men, for all reasons, wend their way to the examining room of the recruiting office.

The vagrants, the great unwashed, are undesirable as a class; they bathe at long and irregular intervals; their habits morally, mentally and physically are scarcely commendable, and they have learned to dislike work. Sometimes I think they should be excluded without exception; the price paid for the few good men is too exorbitant for the undesirables sure to gain entrance. Just as the chain is no stronger than its weakest link, so the man when needed will break at his weak point. The ounce of prevention is also valuable in the work of recruiting.

In all wars the number of deaths from disease has been far in excess of that of casualties, and more discharges are due to sickness than to injuries.

"The examination is very thorough, and includes the mental condition, the principal organs of the body, the general formation, the chest capacity, the condition of the teeth, skin, joints and feet, and the presence or absence of hernia, varicocele and other disqualifications."[2] The recruit must be well-built all around, superior to the average in muscular development, or, if in youth, have potential strength. He must be sound, ready for all kinds of work and sudden strain.

It must always be remembered that the man on the sick-list is counted on the ship's complement of enlisted force, and that his station would otherwise be filled by a capable man. "Such men are not merely ineffective themselves, but exercise a detrimental effect on the morale of their associates. The mental attitude of a man whose physical infirmities prevent him from fully meeting the demands of his station and surroundings soon becomes one of chronic discontent and discouragement, a nuisance to himself, his shipmates and his superior officers."[3] A man, attempting to enter the

2. Practical Hygiene, p. 572.
3. Report of Surgeon-General, United States Navy, 1909.

navy conceals and makes light of any trouble, but once enlisted, the same man magnifies it. A man-o'-war's man can not be coerced when the question of an operation arises and hence, he will often seek his discharge on the slightest provocation. "Certain disease influences are prevalent in, and more or less peculiar to, certain parts of the country, and applicants for enlistment from these sections represent the possibility of being the victims of them in such form and stage of development as would escape detection by the usual routine examination unless specially looked for."[3] Such, for instance, are the apparent heart affections of altitudes like Denver.

"The examining surgeon shall consider carefully the adaptability of the applicant in relation to the character of the duties which he may be called on to perform. Moderate height and compact build are requisite in the rating of fireman and coal-passer. The duties pertaining to these ratings are extremely arduous, and applicants for such positions must conform in every particular to the required physical standard."[4] The examining surgeon should remember that all candidates examined for the several special ratings are enlisted for the performance of all duties pertaining to the naval service, ashore and afloat.

The city-born and bred are already inured to certain hardships and to all diseases of children. Dr. Woodhull, lieutenant-colonel, Medical Department, United States Army, however, says on this point: "In raising new troops, when it is possible to select, for sharp and immediate active service take town-bred men. If a year or two can be added in which to train them, take country-bred men. Open-air military life is physical promotion to city men accustomed to irregular hours, unwholesome meals, and poorly ventilated rooms. To country lads the irregular and sometimes scanty meals, broken rest, necessity for prompt and exact action, and above all the certainty of acquiring such diseases as measles,

4. Instructions for Medical Officers, U. S. Navy, 1909.

whooping-cough, and mumps, which town boys always have in childhood, are very exhausting. After a year's training, country youths are more valuable." [1]

The recruit must be sufficiently young and moldable in order to adapt himself to the new life on board ship which, at the best, is unnatural. The age for entrance must be between 17 and 35.[1]

"It is almost the universal opinion that recruits ought not to be accepted below 20, or better, 22. At 18 years, the recruit is immature; the bones are not fully formed, nor have they reached their final hardness; the epiphyses have not become incorporated with the shafts of the long bones; the joints are not fully developed; the chest has by no means attained its full capacity; and the organs of the body, in general, are immature. So it happens that, at this age, it is useless to expect him to be in good condition after long-continued exertion, or to undergo privations which are nothing to the man of mature years and strength. At this period of life, he is still in the growing stage and needs all the energy of his body to bring the organism to completion, and the influences which mature soldiers contend against with varying degrees of success, namely, vicissitudes of weather, long marches, hard work in trenches, possible overcrowding in barracks and camps, poor ventilation, and poor and insufficient food, send him very quickly to the hospital." [1]

"Taken between the ages of 18 and 20, and drilled and trained with due regard to his immaturity and limit of endurance, the recruit often shows great progress in general development within the first year, particularly if, before enlistment, he was poorly fed, clothed, and housed, and engaged in an indoor occupation. His work should be moderate in the beginning and only gradually increased, since changes for the better in the human body can not be brought about suddenly like those for the worse, induced by attempting to do too much at the outset. Since his lungs, heart, and blood-

vessels are not yet fully developed, he can neither go through the manual nor cover ground like a seasoned soldier. The heart is called on by the new and unaccustomed exercise to contract at a greater rate than had been its habit and the recruit soon becomes 'winded.' "[1]

While it has been the experience that men below 20 or 22 are too immature physically to make good soldiers, this does not hold good in the case of sailors, whose training and work do begin in accordance with his strength, and is gradually increased in demands on the newly added growth; this training occurs under the most hygienic surroundings. The life on board ship and at sea is one filled with novelties, and an open-air existence and the duties incident to this life might well be compared to a course in physical culture, whereby there is obtained a broadening of the shoulders, deepening and expanding of the chest, and a general symmetrical rounding out of the muscular frame. The change in the first year is remarkable; natural growth can claim but a portion of this rapid development.

One must not lose sight of the fact that after enlistment the recruit receives the same watchful care as a new-born babe, or blooded animal. His bathing-hours are prescribed, his clothes selected for him and their cleanliness assured by frequent careful inspections, and his food, likewise, is provided with the same care and regularity.

Men over 35 may reenlist, and more leniency for minor defects is exercised. "An enlisted man, not under treatment, but with infirmities contracted in the line of duty, not such as to prevent his performing the duties of a soldier, may be reenlisted, since it is recognized that what he may lack in some minor particulars in soundness may be counterbalanced by experience and habits of discipline." [1]

The examination is of necessity searching, since disability not only interferes with the best work, but there is in some cases the danger of carrying contagion to

others. Every recruit is immediately vaccinated, and kept in the detention camp three weeks before he is permitted to come in contact with the other men. Every deviation from the normal must be noted for a final estimate, or summing up, in accordance with the navy standard.

In the British army defective development causes the greatest number of rejections, then defective vision, and third, diseases of the circulation. For the last quarter here in St. Louis, out of 689 applicants, 169, or 23 per cent. were accepted. Of these 689, 140 or 20 per cent. failed because of poor physique (underweight). The following rule is followed: Up to 5 feet 7 inches the weight should be twice the height or 2 pounds to the inch, and for every additional inch 7 pounds more in weight must be added. The chest measurement is a little less than one-half the height. The biggest men are the most deceptive in appearance, and can not be depended on for endurance, far from it. Men of the laboring class are often properly proud of their muscular development, and with great self-assurance undergo the physical examination, in many cases only to be bitterly and perplexedly disappointed.

Of the 689 applicants 102 or 14 per cent. failed because of defective vision.

"No applicant should be recommended as qualified for the rating of gun-pointer who can not read with the right (or aiming) eye at 20 feet the line on Snellen's test-card, which is normally seen at 15 feet (i. e., 20/15 vision). The minimum of 20/20 vision should be required with the eye not used in aiming. The test-card should be well illuminated."[4]

It is astounding how great is the amount of ignorance due to faulty eye-sight alone. Some men attempt to read the test-card twice with the same eye or to memorize the letters; one applicant with 3/20 vision in each eye had never worn glasses. Of the 689 applicants 13 per cent. were rejected for flat-foot, 6.5 per cent for

heart affections, 5.5 per cent for defective teeth, and 4.5 for color-blindness.

For Asiatics, enlisted as mess attendants, the bars must be lowered from the American standard of physique to one corresponding with the former race, though one should always be on guard against such diseases as plague and beriberi. The Filipino is of smaller stature and the requirements are that young men of 18 to 19 years of age must weigh 105 pounds, (15 pounds lighter than the American average) and have an expansion of 2 inches; those men of 21 years of age must be 62½ inches in height, must weigh 110 pounds and have a chest mobility of 2½ inches, in sharp contrast to the American of the same age, who must weigh 18 to 20 pounds more.

Men for the hospital corps must be superior to the average applicant; a grammar-school education is required for the men intended to perform a special and responsible work, to assist the surgeons in his varied duties, acting as his first assistant or anesthetist during major operations; in fact, their duties correspond to those of the male trained nurse of our professional brethern practicing ashore. To make assurance doubly sure, the recruit must sign a clean bill of health: "I believe myself to be physically qualified to perform the duties of the rating in which I may be enlisted." Likewise, the examining surgeon certifies that "I have carefully examined, agreeably to the regulations of the Navy, the above-named recruit, and find that, in my opinion, he is free from all bodily defects and mental infirmity which would in any way disqualify him from performing the duties of his ratings, and that he has stated to me that he has no disease concealed or likely to be inherited."

The one essential requirement for the best results in recruiting is the strict adherence to a fixed, invariable, systematic routine method of examination.

The medical officer must possess the proper spirit for recruiting to secure men physically good; he must exercise good judgment in the case of men on the borderline, never forgetting the important reasons for giving the government the benefit of all doubt, being very careful to note all minor defects which do not necessitate the rejection of the applicant. All kinds of influence are brought to bear on the judgment of the examining surgeon, aside from the question of competition of the recruiting officers to make a record in number rather than the standard of recruits of those enlisted. Physicians in civil practice, as well as politicians at times make it very emphatic how desirable it is to the government to obtain the services of their sons or friends.

The opposite state of affairs is illustrated by a pathetic though rather amusing instance: A young man of 21 desired to enlist while we were at Savannah, Ga. The mother called on board and, with a distressing flow of tears, asked how her son could be enlisted when the family physician sent word that he was physically incapacitated. There being no defects, the boy was qualified physically, much to his own delight. The father came on board with a gun to compel, in this gentle way, the non-acceptance of his son. The boy decided to run away from his family and of his own volition, being of age, joined his chums at the railroad station. We sailed down the coast and up the Mississippi river as far as Cairo, Ill., making numerous stops for the purpose of recruiting, and in the course of about four months we returned to Savannah, Ga. Meantime the young man had sent home photographs and graphic accounts of the fascinating life of the training station. The first day in port the mother came on board and, with similar tears, begged us to enlist her younger son, who, by the irony of fate, failed to pass the physical examination.

It has been demonstrated repeatedly that physicians ashore do not obtain the best results in recruiting, simply because they have not had the peculiar training which is acquired only under actual service conditions.

After this brief review of some of the more salient features of the subject of recruiting for entrance into the United States Navy, I believe that all will agree with me that good powers of observation, a keen eye, mental alertness, considerable knowledge of human nature, complete understanding as to service conditions and the calls that are made in each rating, besides a proper interest for the service are prerequisites in the medical officer who is detailed for the recruiting office, where, by far, the major part in the way of preventive medicine is accomplished for the navy.

HOUSE QUARANTINE

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CHICAGO

It is hard to separate the causation of disease in man from the influence which organized society exercises on him. The relations are many and complex, acting in divers ways, and not always with visible directness. For one thing, if you think of it, the important factor of heredity in the causation of disease is, truly and broadly considered, a social factor. And when we mention environment, the other half of the entire etiologic circle, it is readily seen that that in particular depends on the social aggregate and its intelligence and activities in behalf of the preservation of health for its composition and complexion, for the power of doing good or evil, for its influence on health and disease.

Man probably suffered from certain diseases and accidents in his pre-social days, but that the greatest percentage of man's present ills is socially caused, directly or remotely, is a certainty. Whereas the above applies, more or less, to all diseases, it is particularly applicable to the contagious diseases. Seed, soil and the planting of the seed are the three requirements in the causation of contagious disease; man himself fulfills two of these; he offers the soil and acts as disseminator of the seed through the avenues of social intercourse.

It follows that the control of contagious disease is a proper and necessary function of organized society. The individual is now considered an asset of the state, which

would suffer loss by his illness or death, even if the effects were limited to himself. How much greater the mischief and loss is to the community in the case of contagious disease, anyone can readily see. And the community owes each of its citizens protection against contagious disease as well as against fire, against robbery and murder.

THE QUARANTINE PROBLEM

When the prevention of disease first claimed public attention, when it first began to be the concern of organized government, it was readily seen that the gathering of health statistics was of prime importance. And so it is, if properly utilized. Health statistics should furnish a guide as to proper health measures and methods; it should indicate to us the preventable leaks to life and health; it should be an aid, and not an aim. By itself it will accomplish nothing. We must not stop with that. Advanced and aggressive attitude and action is urgently needed in the control of contagious diseases.

In house quarantine, we have an important measure in the safeguarding of the well from the existing foci of infection. It is a truism to say that the essential features of the contagious diseases are their communicability, yet the fact needs emphasizing. There was a time when, owing to the lack of knowledge as to the cause, and by reason of the prevalence of superstition, epidemics of contagious diseases were attributed to visitations from heaven. Those times are, happily, passed. We now have a more exact knowledge of the cause of contagious diseases. We are now better able to cope with them because we more fully understand the actual determining cause, the various pathogenic bacteria, the contributing factors, and the means and modes of how these germs are carried from the sick to the well.

But we must make intelligent application of this knowledge if we are to minimize these diseases. We believe that persistent application of the principles of

preventive medicine will ultimately lead to the almost total eradication of contagious disease.

A survey of the premises of the quarantine problem brings to the fore the following as the most salient:

1. The patient the only original source of infection.
2. The patient and contacts the most dangerous carriers spreading infection.
3. Houses and objects such as bedding, clothing, toys, etc., harbor and give off infection.

How best to meet and circumvent the difficulties presented by these three factors is the crux of the quarantine question.

Before outlining the measures and methods here advocated and now in force in Chicago, let us dwell for a moment on conditions as they are with respect to the management of contagious disease and the many relations which it has to the public health. The statements here made are chiefly based on experiences in this work gained in Chicago. I am sure that they apply to a greater or lesser extent, to all larger towns and cities.

In our daily work we come in contact with people of all races and nations, people of all degrees of material welfare and educational status. We find the greatest disregard for the proper management of contagious disease, the greatest hindrances, due to the following causes:

1. The thraldom of inhumanizing poverty in which great numbers of the foreign-born population find themselves, with the woeful overcrowding attendant on it.
2. Ignorance and superstition—dense, miry and demoralizing—productive of a stupid disregard for all health regulations.
3. A peculiar nonchalance on the part of the semi-intelligent who think that they know it all and need not be taught how to properly care for a contagious case or themselves be subject to necessary restrictive measures.
4. The outright and outrageous assertion of self-interest against community interest on the part of some of the wealthy families and individuals in the community.

The following concrete instances elicited in a recent series of investigations to determine the exact mode of spread of contagious disease, will illustrate conditions as they are:

Series 1.—Diphtheria, six cases, two deaths. A child took sick with "sore throat." No physician was called in. The child grew worse and died. In the next house lived a relative of the above family whose daughter took sick several days later and also died. Four more cases rapidly developed in the surrounding families. Investigation showed that all had been visiting each other, had traded in the same neighborhood stores and otherwise neglected the most ordinary precautions.

Series 2.—Scarlet fever, four cases. First patient took sick on the eleventh of the month. The family in which the case occurred owned a small store, and through fear that the business might be interfered with, called no doctor. The case was not discovered until the fourth of the following month—nearly a month after it developed. Meanwhile the patient was out playing with other children, three of whom took the disease from her.

Series 3.—Scarlet fever, six cases. A boarder in a poor family returned from the hospital where he said, he had a "sore throat" and a "breaking out." Eight days after his return a 19-year-old son of the family, who shared the same bed with the boarder, developed scarlet fever and two days later, two other children of the same family came down with scarlet fever. The three patients were removed to the hospital and the boarder was asked to seek another place. The house was immediately disinfected. Within a week two more children came down with the disease.

Series 4.—A youngster who was delivering newspapers into a scarlet-fever-infected house, himself came down with scarlet fever. His playmate and companion who went around with him while delivering the newspapers, also took the disease.

Series 5.—A little girl convalescing from scarlet fever met her chum; the usual kissing and embracing ensued. Several days later the other little girl was stricken with scarlet fever.

The instances are innumerable, repeat themselves everywhere, and are well known to you. They go to show that the people are ignorant of the primary laws of contagious disease and of the danger that lurks in them. It proves that we have neither sense enough to protect ourselves, nor conscience enough to protect our

neighbors. It indicates a degree of public lethargy toward the existence of preventable disease and death that harks back to the dark ages.

In another series of investigations to determine the source of infection of cases of diphtheria and scarlet fever reported during the period of a week, the following was learned from those whose direct connection with a previously existing case was definitely established.

1. Twenty cases were traced to the association with a patient in the immediate vicinity.
2. Ten cases were due to association at school with children in whom the disease was unrecognized.
3. Four cases were caused by contact at the playgrounds with children in whom the disease was mild or undeclared, or with convalescing patients.
4. Three cases were found to be the result of an unreported case.
5. Two cases owed their existence to previous cases in the family.
6. Many cases were attributed by the family to a "cold"—only a predisposing factor, if true. More likely, the first signs of the illness, particularly in diphtheria, were taken for a cold.

The lesson is the same no matter what superficial cause may be assigned. It is always association with a previous case, in one way or another.

In the poorer sections of the city, it used to be the usual thing to find mothers with diphtheria-sick children in their arms gossiping with neighborhing women likewise with babies in their arms and with several older children clinging to their skirts. Tales of woe are exchanged, sympathies are extended, and disease is given in return. Children suffering from scarlet fever in the convalescent stage were almost always found outside when the weather permitted, with hands desquamating, neck perhaps swollen with suppurating glands, surrounded by a crowd of boys all gamboling on a vacant lot, all absorbing the insidious elements of contagion. Visiting and receiving callers during the quarantine period is quite the thing with certain classes of people. Allowing the inmates in contact with the patient, as

well as the patient himself, to run loose on the streets and mingle with the well, is an almost universal practice.

When the people shall appreciate the enormity of the crime of throwing a burning fagot of contagion into a mass of disease-inflammable children, such practices as above will be no more. Then the burden of sickness, the host of innocently crippled children and the toll of death will be much less—very much less. That the danger of conditions as they exist has been theoretically recognized is attested by the laws and ordinances everywhere in existence, if not in force. In almost all cities there are adequate laws and ordinances which, if rigidly applied, would meet the problem. The fault lies with the lack of enforcement of the same. The attempts at enforcement are spasmodic: It usually takes an epidemic to stir the people into apprehension and the authorities into action. Here, too, in the very field of preventive medicine, that famous "ounce of prevention," has not yet been pounded into consciousness and practice. As a rule, the entire problem of the care and handling of contagious disease, the proper observance of quarantine, is at present left to the good or ill will of the variously constituted communities with their different grades of intelligence, material environment, hygienic knowledge and moral sense.

The practical measures now in use in advanced communities do not adequately take care of the situation.

Placarding premises harboring a contagious disease neither keeps the inmates in nor does it keep visitors out. It is a good measure, but in itself not sufficient.

Initial inspection of cases reported, where in use, establishes a perfunctory quarantine, but does not and cannot maintain it.

Termination by disinfection after the patient and contacts have mingled with the public and spread contagion broadcast is like locking the stable after the horse is stolen.

The needs of the situation are for better laws where the laws are deficient; for action tending toward the rigid enforcement of quarantine by prompt reporting, placarding and establishment of quarantine of infected persons and premises.

The need—the greatest need—is for a stringent thorough-going personal inspection of quarantined premises and cases they hold every day, or at least every other day. The need is absolutely to keep the inmates in and the outsiders out during the quarantine period. Those ordered to live away from home must be made to stay away. The exclusion of those living on the premises in a different and properly separated part of the house, as prescribed, from the rooms occupied by the patient and attendant must be enforced at all times. The need is for supervision of the means of taking in supplies into the infected house and particularly the manner of removal of articles from the premises.

In brief, there is need for personal knowledge of each case, the respective district, its inhabitants and the conditions obtaining there; there is need for bringing this knowledge to bear on each and every phase of the contagious disease situation; there is need for a man to be constantly on the ground to study, observe, teach, watch, correct and enforce the observance of quarantine as above outlined.

THE ENFORCEMENT OF QUARANTINE IN CHICAGO

In the beginning of December, 1908, the contagious disease situation as pertains to scarlet fever and diphtheria, became threatening. Neighborhood epidemics were springing up in every section of the city. It was feared that the experience of 1907, when half of the entire city was enveloped in scarlet fever, would be repeated. One of the worst local outbreaks occurred in the south side of the city and originated from several cases of scarlet fever found in the "peeling" stage, in a parochial school.

From Dec. 15, 1908, to Jan. 26, 1909, thirty-six cases of scarlet fever were reported in rapid succession from an area comprising 144 city blocks. Conditions in other sections of the city were similar. I then proposed the quarantine plan now in force, of which the following are the outlines:

1. The city was to be districted, for purposes of adequate control, into more or less equal divisions, taking into account the extent of territory and the number and character of the population in the respective districts.
2. A quarantine officer and disinfector was to be stationed in each district.
3. It was to be this officer's duty to enforce the observance of quarantine, to have an intimate knowledge of every case and its environment, to hem it in and hedge it in so that it would not give rise to other cases, to know when it was ready for disinfection, and to disinfect same when ready.
4. He was to report daily as to the condition of his district, the number of current cases, the number of inspections, the number of disinfections, etc.

This plan was applied to the district above referred to. On Jan. 30, 1909, strict quarantine of all infected persons, premises and contacts, was instituted. House-to-house calls were made by our inspectors each day or every other day, as conditions required. Working members of the family in which contagious disease existed were compelled to stay away from the infected premises; those remaining on the premises were properly kept away from the patient and attendant. The delivery of milk and other supplies to the infected premises and the removal of the necessary waste were regulated in accordance with the quarantine regulations. Semipublic places, such as grocery stores, bakeries, meat markets, candy stores, etc., were warned against admitting any one from infected premises. Visitors were barred and excursions prohibited. Quarantine became a fact.

Where cases were ready for termination, patients and inmates, premises and belongings, were disinfected, and quarantine raised.

The results obtained were very gratifying, in spite of the newness of the task. In the next nineteen days, but one new case appeared, on February 2, and it is probable that the infection dated prior to the beginning of rigid enforcement of quarantine. On February 20 only twelve cases remained in the district.

This experiment was repeated and tried out in two other districts widely different in complexion and distantly separated. One of these was taken under control on February 24 with forty-eight cases of scarlet fever and diphtheria in it at the time. In a month the number of cases were forced down to nineteen, a reduction of nearly 60 per cent.

At the same time we quarantined another district with thirty-three cases in it. At the end of a month the number of cases current were fifteen, a reduction of over 54 per cent.

Following the above experiments and their results, the plan was put into operation over the entire city, and applied to all cases of diphtheria and scarlet fever. This plan will now be described in somewhat greater detail.

It is readily seen that absolute isolation of the patient is the keynote of the entire problem. Not all cases are similarly situated with respect to the immediate surroundings. Some of the cases are located in fine residences, others in flats, still others in hovels. All throughout it is a process of adaptation to environment and all throughout the essential of isolation is kept in mind.

The patient and attendant are put into one or two rooms at one end of the house or flat. This part of the house is separated from the other rooms in the house by having the intervening door locked and sealed, provided there is a separate entrance to them. They should also contain all the necessary household facilities such as water, toilet and cooking facilities. Here the patient and attendant, nurse or mother, as the case may be, are required to remain during the entire quarantine period. No one is allowed to enter their quarters except the

attending physician and the health officer, when necessary for the purposes of control. The body and bed linens are to be disinfected before removed, the garbage and house sweepings are to be burned or disinfected, in fact, all the details of the hygiene of the sick-room are under surveillance of an officer of the health department.

Where such ideal conditions obtain, the workers of the family are allowed to go about their business without any interference, providing however, that at no time is there any direct or indirect contact between them and the patient or attendant. The part of the house which they occupy is, as said above, separated by a locked and sealed door from the patient's quarters. Where the bath-room, cooking and the other facilities of the house are in use by the patient, the workers must arrange for the use of these facilities elsewhere.

But ideal conditions are not found everywhere, as every one knows. In many cases the construction of the flat or house will not permit absolute isolation as above indicated; the family may occupy a four-room flat with only one outside entrance, where such arrangements as above outlined are manifestly impossible. Again there may be other children in the family and the people too poor to employ a nurse. It may be said that the greater the difficulties in the establishment of good quarantine, the greater the necessity for it. It is no dead subject; it is not cut and dried; it requires the exercise of sound hygienic principle, common sense and tact. Where the patient cannot be perfectly isolated, we insist that the working members of the family should live away from home while the case is in progress. If they remain at home, they are not allowed to continue at their occupations. These are essentials that we absolutely insist on.

We not only center our attention and efforts on the persons of the patient and the other members of the family, but we are, in this work, concerned with the innumerable details of human life in so far as they have

a bearing on this problem. In flat buildings it frequently happens that there is one toilet for the use of two families living on the same floor. In such cases, the well family is instructed to arrange for toilet facilities elsewhere in the building, and the members of the family under quarantine are to use the nearest toilet.

Another important feature to which I want to call attention is the particular effort that is made to protect the other children in the same family where there is a case in existence from infection. From the health and humanitarian points of view, it makes no difference whether the second patient bears the same patronymic or not—whether it is Smith or Jones. We are, in a way, more responsible for a second or third case in the same family, because we ought to have anticipated and prevented it. In diphtheria, the problem is partially solved by immunization, but in scarlet fever nothing short of removal or rigid separation of the well from the sick in the family proper will save the susceptible.

This is not fully recognized. We owe protection only not to others outside of the family, but also to the members of the afflicted family. To this end mothers are especially warned to beware of the dangers of combining the duties of nurse and housekeeper where there are other children in the family. The families afflicted with contagious disease are guided and helped through the trying period of the illness in every way possible.

We aim to do the work in a scientific and sympathetic way. While it frequently becomes necessary to be insistent and stern in order to protect the public health, no undue intrusion on the rights of the individual is practiced.

We recognize that the best results can be obtained by securing the good will and cooperation of those with whom our task lies. We try to make them conscious of the fact that they owe a duty to the community; to make them see their self-interest in the light of the community interest.

The correlative factors in this work, operating for or against it are the following:

1. Economic conditions.
2. Education.
3. Hospitalization.
4. Policing.

Economic conditions, poverty and its congener, ignorance, are by far our greatest opponents in this work. Rigid quarantine no doubt works a hardship on many poor families; it calls for a sacrifice of an altruistic character that many do not understand.

Education is our greatest ally. To bring knowledge to the ignorant and awaken a sense of duty in the careless is the first step. In a task of this kind, we can look for the full fruition of our work only when the poor and ignorant better understand their own interests in these matters and the well-to-do and well-informed have been sufficiently impressed with the necessity of giving thought to the interests of others. In this campaign of education the family physician occupies an important position. His efforts and influence should be freely given to the cause of health.

Hospitalization of contagious cases is, of course, the surest means of securing isolation of the patient. It is, unfortunately, impossible to always do that at present, both on account of the lack of adequate hospitalization facilities for contagious cases, and for the reason of an opposed public opinion to such a measure as universal hospitalization. It has, however, a two-fold bearing on the quarantine situation.

On the one hand, the rigid quarantine regulations induce many families to send the patients to the hospital; on the other hand, the fear of having the patient forcibly removed to the hospital in case quarantine regulations are violated makes them live up to these regulations.

It frequently becomes necessary to police the quarantined premises, when the people are careless and refractory and the danger of the spread of the disease is considerable. This always has a salutary effect. It convinces them that the department means business and

they readily fall into line and are willing to learn and observe the regulations.

This system of quarantine enforcement in Chicago, as far as diphtheria and scarlet fever are concerned, has been in existence a year now. One year is a very short period for such an undertaking. The difficulties were many, and the means at hand, as far as money and men are concerned, were inadequate for the task in hand. Yet a considerable improvement in conditions was achieved, both as to the educational influence it had on the public, resulting in a changed attitude towards necessary health measures and a broader knowledge of the same, and also in its direct bearing on the morbidity of scarlet fever and diphtheria. This system of quarantine regulation and surveillance was inaugurated in May, 1909. It did not get well under way until about September. Here is a comparison of the number of cases reported during the twelve months preceding quarantine enforcement, with that following it:

COMPARISON OF NUMBER OF CASES REPORTED BEFORE AND AFTER QUARANTINE ENFORCEMENT

SCARLET FEVER

1908	May	301	1909	May	455
	June	287		June	382
	July	203		July	261
	August	173		August	216
	September	297		September	342
	October	608		October	514
	November	841		November	684
	December	914		December	686
1909	January	881	1910	January	688
	February	590		February	671
	March	644		March	692
	April	587		April	600
		6,336			6,191

DIPHTHERIA

1908	May	254	1909	May	378
	June	306		June	320
	July	255		July	268
	August	251		August	223
	September	341		September	327
	October	788		October	550
	November	880		November	719
	December	934		December	601
1909	January	745	1910	January	468
	February	522		February	443
	March	522		March	470
	April	483		April	527
		6,281			4,924

As to scarlet fever, we see that from May 1, 1908, to May 1, 1909, 6,336 cases were reported; in the following twelve months 6,191 cases were reported, a saving of 145 cases. This in spite of strongly pronounced epidemic tendencies; this in spite of the fact that a comparison of the cases reported during the calendar years, 1908 and 1909, shows that there were 5,305 cases reported in the former and 6,242 in the latter, showing a preponderance of 937 cases of scarlet fever in 1909.

In the case of diphtheria, the results obtained were still more gratifying. From May, 1908, to May, 1909, 6,281 cases were reported. From May, 1909, to May, 1910, 4,924 were reported, a reduction of 1,357 cases; and here also more cases have been reported during the calendar year 1909, than during 1908.

The proper observance of quarantine has now come to the fore as an efficient means to control the contagious diseases. It does away with the weak points in handling contagion in a large city. It helps do away with the leak and dribble of careless individual negligence which does the community so much harm. As a preventive measure, it has emerged from the realm of theory, and has now firmly established itself by virtue of actual experience, which showed its necessity and practical utility.

1400 West Taylor Street.

ABSTRACT OF DISCUSSION

DR. B. FRANKLIN ROYER, Harrisburg, Pa.: Dr. Cohen has outlined a type of quarantine which is ideal in a large city, but which is applicable only in cities or towns of considerable size. It is not always possible to have the kind of supervision and espionage kept up in the country districts and small towns which is practiced in Chicago. In such places we must rely more on educating the family itself. Too often, I fear, a quarantine officer placards the premises, instructs the people as to what they are to do, and walks away. If he is in a hurry he may not go into great detail; perhaps he may not himself be sufficiently trained, if he is a layman, to go into detail of complete isolation and explain the necessity for keeping up isolation until the termination of the case.

An idea was well brought out this morning in Dr. Hemenway's paper, and perhaps it would make a very strong point

in any suit, if violation of quarantine comes to that point, to be able to say that the family was fully instructed and that the instructions handed them were printed in full detail. The Pennsylvania Department of Health uses such a circular of instructions for each communicable disease. It includes details of isolation, describes the method for the disinfection of discharges, and at the conclusion of the leaflet an extract from the law is quoted. A similar extract from the law is printed on the placard. This plan not only instructs the householder, but offsets a plea of ignorance on his part. Physicians know what these circulars of instructions contain. It saves them a great deal of time and helps them in the work, and after all it is to them we must look for keeping up the domestic quarantine.

DR. SENECA EGBERT, Philadelphia: I think Dr. Royer will bear me out that in our great small-pox epidemics the plan of putting either one of the regular policemen or a special man sworn in as a policeman in the house in which the disease is, and keeping one there night and day, is a good one; that is, the plan of keeping the guard there, with allowing ingress or egress to those who might carry infection beyond the premises. Another thing is the necessity of common sense. There are a great many physicians who do not appreciate how valuable this is. You can make the routine disinfection and care of a room in a case of illness lasting two or three weeks very tedious and annoying. Boiling water can be had in almost any household, and most things that come from the room can be boiled with almost no trouble for the thirty minutes or the hour that is necessary for thorough disinfection. With a little bit of bichlorid solution and boiling water any household can accomplish the disinfection of dishes, clothing and the like, and with a little chlorinated lime or ordinary milk of lime in addition for the excreta, one has about all that is necessary. This simplifies the task of regular and persistent disinfection.

DR. I. D. RAWLINGS, Chicago: Dr. Cohen failed to mention a number of things I thought he would bring out. One thing is that the man who makes the first inspection, gives the instruction, gives out important literature (samples of which I supposed would be shown here under this paper), is a thoroughly trained medical health officer, who knows just exactly what instructions to give, exactly what to do, where to place placards, all the detail. He, while there, leaves instructions for the quarantine officer as to exactly what quarantine shall be established, says who shall be in that house, who shall go to work from that house, etc. This is all written down on a special blank and placed back of the red sign on the front door. The quarantine officer comes along the following day, removes this written statement of quarantine require-

ments, and in this manner knows exactly what instructions have been given the family by the medical inspector—has the full detail, and it is his duty to call every other day and see that the requirements are carried out.

We are living up religiously to our Rule 10, which says: "The members of the family who work out must (1) live in a part of the house remote from the patient and keep away from all persons coming in contact with the patient; or (2) room and board at another house; or (3) stop work and stay in the house.

DR. HYMAN COHEN, Chicago: It was my object in this paper to give a general review of the methods, not so much in detail, as in the broad sense indicating policies and lines of activity, or, rather, to indicate especially detail which I hoped would be brought out in the discussion. I want to answer some of the points made here by the speakers categorically. The statement that it is not possible to manage detail in the small communities is very true. It is not only not possible to do so in the smaller communities, but it is very often almost impossible to do so in the larger communities, where you work under the handicap of a limited appropriation. I have had to skip quite a good deal in order to come within the time limit; and many of the things mentioned as being left out are in the paper.

The repeated visits made and the oversight to see that the orders are followed out are just the points wherein the present system of quarantine inspection differs from the old system, in which the man would put a red card on the door and turn on his heel and walk off.

There are two essentials: information from the family, and then to give the family information as to managing the case; they want that; and the man must not leave the premises on his initial trip before he imparts that information, and is satisfied that they fully understand the matter; and it frequently is necessary to get an interpreter when one is dealing with Italians and other foreign-born people who do not speak the language.

We have printed instructions. It would be interesting to find out how many of the hundreds given out are read intelligently and carefully. We are doing a great deal in the way of personal instruction of the family directly, or through an interpreter.

As to the physician's duties in case of contagious diseases, there is much to be said. There are all sorts of physicians in Chicago, as elsewhere. Some are antagonistic or careless; some are in sympathy with our work; but there is no one factor that is of as great importance in this entire situation as the physician factor. It is up to the physicians to "get next" to the progressive work that is being done in this line;

for if they don't, they will be left behind; progress will be made in spite of their indifference.

We not only put a policeman at the door, but frequently two: one at the front entrance and one at the rear; and two means four, because they work in relays, night and day. It is important; it brings the people to a realization of the fact that we mean business, and it has a salutary effect on them.

Common sense and tact are the greatest factors. You cannot compel a Chicago community, or any other large community, to observe strictly any precaution they have never used before —that they perhaps have never heard of before. Many of these families have had a case of contagious disease for the first time; they do not understand the situation, and if you go at them abruptly you will lose out. This is where experience and tact come in. We try to have inspectors with common sense and education, so far as possible.

We allow nothing to come from the room without being thoroughly disinfected; and we supply bichlorid tablets; we make a solution in a wooden bucket right in the room, and not only are the linen bedding and the nurse's clothes disinfected, but also the bed-clothing, and the floor is mopped daily.

THE PREVENTION OF INFANT MORTALITY

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AND
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CHICAGO

The importance of preventing sickness and death in infancy has been generally recognized during the last decade by many European countries. In our country this problem has been growing, and when carefully analyzed is found to be really of greater magnitude than the problem of preventing tuberculosis, when considered from the standpoint of deaths involved. The organization of the American Association for the Study and Prevention of Infant Mortality, in November, 1909, has resulted in a more general recognition of conditions in this country, and has been followed by efforts to deal with the existing conditions, together with their causes.

Sanitarians hold that the infant mortality rate is a test of real sanitary accomplishment. Sir John Simon pointed out that a high infant mortality rate indicates the existence of evil conditions in the homes of the people. George Newman in the preface of his recent treatise on this subject, concludes that the loss of infant life is in some way intimately related to the social life of the people.

The young of all animals are more susceptible than the adult to the influences of unfavorable circumstances in the environment. With advancement in civilization, the infant death-rate should become less. Man has succeeded in guarding judiciously against the death of the young in his domestic animals, but has not succeeded equally well with his own race. Comprehensive statistics are not available on the death-rate of young cows and horses, but we feel safe in making the assertion that the rate is lower than the infant mortality rate. In the registration area of

the United States nearly one-fifth of all deaths is of infants under one year, and one-fourth of the total mortality is contributed by deaths of children under 5 years of age.

In Chicago the total deaths during 1909 were 31,300; of this number 9,368 were in children under 5 years, and 6,357 in children under 1 year of age. Thus the deaths in children under 5 years constituted approximately one-third of all deaths.

STUDY OF INFANT MORTALITY STATISTICS

That the cause must be known before a remedy can be applied is a well-established rule in medical practice. Sociologic problems have to be dealt with in the same manner. Thus before suggesting preventive measures, it behooves us to make a survey of the existing conditions and study them in relation to prevailing etiologic influences.

The general death-rate from all causes in this country and nearly all other civilized countries has been steadily declining, while the infant mortality rate has remained stationary, or at least has shown no material reduction.

For purposes of comparison Table 1 from Newman, contrasting the birth-rate, death-rate and infant mortality rate of the principal European countries, during the last and previous decade, is useful.

TABLE 1.—BIRTH-RATE, DEATH-RATE AND INFANT MORTALITY RATE OF PRINCIPAL EUROPEAN COUNTRIES

	Birth Rate		Death Rate		Inf. Mort. Rate		
	1883-92	1893-02	1883-02	1893-02	1883-92	1893-02	03
England and Wales....	31.9	29.3	18.9	17.6	144	152	132
Scotland	31.8	29.9	19.2	18.0	120	127	...
Denmark	31.6	29.9	18.7	16.5	135	133	...
Russia	48.4	48.8	34.6	32.9	270	272	...
Germany	36.6	36.9	24.7	21.5	...	195	...
Prussia	37.2	36.5	24.2	21.2	207	199	194
Austria	37.7	37.2	29.1	25.9	...	227	...
Hungary	45.5	39.9	32.3	26.3	...	224	212
Netherlands	33.7	32.3	20.9	18.5	176	152	135
Belgium	29.8	28.9	20.7	18.3	161	157	155
France	23.4	22.0	22.2	20.8	167	158	...
Spain	36.0	34.7	31.9	28.7	...	190	...
Switzerland	27.8	28.2	20.3	18.5	160	145	133
Italy	37.5	34.2	26.9	23.3	209	173	...

Table 2 shows the infant mortality in Chicago, compared with other American and European cities.

TABLE 2.—PROPORTION OF INFANTS WHO DIE BEFORE REACHING THE AGE OF ONE YEAR. DATA FOR CERTAIN LARGE CITIES FOR THE DECADE 1898-1907

Cities	Births	Deaths	Percentage
Buenos Aires	335,634	33,305	9.9
Paris	539,372	61,084	11.3
Chicago	457,604*	55,564	12.2
Amsterdam	149,922	18,483	12.3
Rome	119,674	15,786	13.2
London	1,195,668	187,593	14.5
New York (M. & B.)	610,360	98,661	16.1
Brussels	41,751	6,954	16.7
Hamburg	204,467	35,499	17.4
Vienna	509,918	92,964	18.2
Warsaw	247,135	45,243	18.3
Venice	39,725	7,307	18.2
Berlin	496,702	100,033	20.1
St. Petersburg	382,270	98,317	25.7
Moscow	380,727	131,605	34.6

*Estimated for intercensal years.

TABLE 3.—CAUSES OF DEATH AMONG CHILDREN UNDER ONE YEAR OF AGE FOR THE FIVE-YEAR PERIOD, 1904-1908

	Total	Percent of total under one year
Diarrheal Disease Group	12,176	39.8
Diarrheal diseases*	9,709	31.7
Convulsions	2,019	6.6
Gastritis	448	1.5
Congenital defects and accidents	7,362	24.0
Premature birth	2,474	8.1
Congenital debility	2,307	7.5
Injuries at birth	409	1.3
Other congenital defects	2,172	7.1
Impure-air disease group	6,298	20.6
Pneumonia	4,308	14.1
Bronchitis	1,896	6.2
Influenza	94	0.3
Four chief acute contagious diseases	993	3.2
Whooping-cough	541	1.8
Measles	195	0.6
Diphtheria	161	0.5
Scarlet fever	96	0.3
Meningitis (simple)	722	2.4
Tuberculosis (total)	486	1.6
Meningeal	195	0.6
Pulmonary	183	0.6
Other	108	0.4
Venereal disease	386	1.3
Syphilis	368	1.2
Gonorrhea	18	0.1
Violence (total)		
Sunstroke and heat prostration	27	0.09
Suffocations (overlying, etc.)	75	0.25
Other accidents	84	0.27
Homicide	107	0.35
Diseases of urinary system	...	0.6
Nephritis (acute)	146	0.5
Other urinary diseases	47	0.1
Rickets	146	0.5
Tetanus and trismus nascentium	100	0.3
Total deaths under one year of age	30,598	

* Diarrheal diseases include cholera infantum, summer complaint, dysentery, diarrhea, gastro-enteritis, enteritis, etc.

The studies of Newman on the distribution of infant mortality show that the rate is higher in cities than in rural communities. The diagram (Fig. 1) from Devine contrasts the infant mortality rates in the city and country.

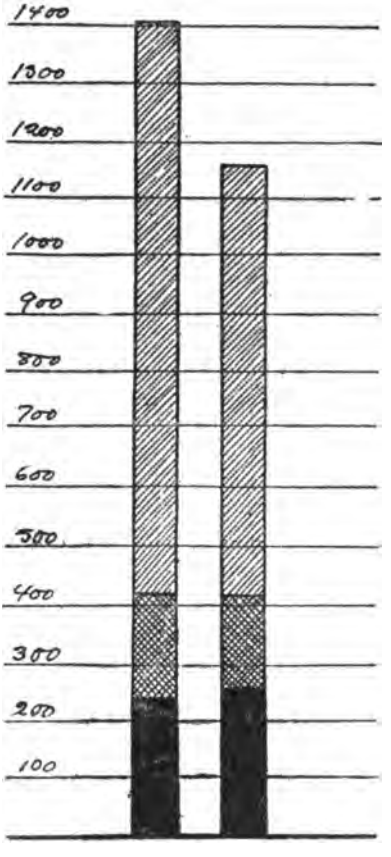


Fig. 1.—Infant mortality rates per 10,000 births in 1902, in London and certain rural counties.

	London	Rural Counties
Under 1 year	1,403.0	1,158.8
Under 1 month	417.5	414.6
Under 1 week	240.5	258.8

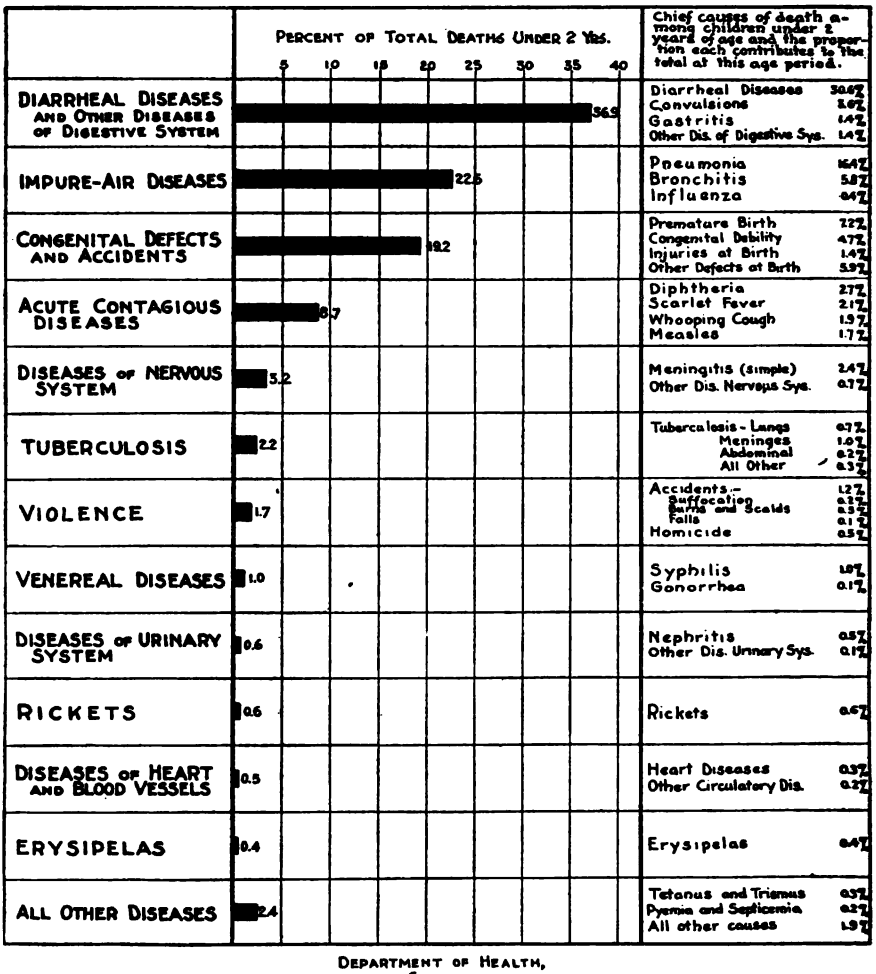
An analysis of infant mortality in Chicago, as to the causes, distribution and relation to environmental conditions, is given in Table 3.

WHAT KILLS THE BABIES

THIS DIAGRAM SHOWS THE CHIEF CAUSES OF DEATH AMONG CHILDREN UNDER TWO YEARS OF AGE AND THE RATIO OF EACH CAUSE TO THE TOTAL DEATHS IN THIS AGE DIVISION.

In each 100 deaths among children under 2 years of age 37 are caused by diseases of the digestive system; 23 by the impure-air diseases; 19 by defects and accidents at birth; 9 by acute contagious diseases; 3 by diseases of the nervous system; 2 by tuberculosis; 2 by violence; 1 by venereal diseases; etc.

70 PERCENT OF SUCH DEATHS CAN BE AVOIDED – WITH PROPER CARE



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No.5

Fig. 2.—Diagram showing the chief causes of death among children under 2 years of age and the ratio of each cause to the total deaths in this age division.

An analysis of the age distribution of children who die before completing the first year of life shows that approximately 7 per cent. die in less than twenty-four hours after birth, at an average age of 4 hours, 41 minutes; 14 per cent. in from one to seven days, at an average age of 2 days, 17 hours; 53 per cent. in from seven days to six months, at an average age of 2 months and 10 days; and 26 per cent. when between 6 months and one year of age, at an average age of 8 months and 15 days. The average age of those dying before reaching the age of one year was 3 months and 19 days.

Out of an approximate total of 152,500 born in Chicago in the three years 1907-1909, 1,447, or 9.5 per thousand, died in less than twenty-four hours after birth; 4,354, or 28.5 per thousand, died in less than seven days; 14,479, or 96.8 per thousand, died in less than six months; 20,012, or 131 per thousand, died before completing the first year of life. Chicago's record is much the same as other large American cities.

The effects of population congestion, nationality, sanitary conditions and other environmental influences affecting infant life, are portrayed in a striking manner by the spot maps and diagrams of the Chicago Health Department which are herewith presented.

On the outline ward map of Chicago (Fig. 3) are shown the location of 1,570 infant deaths by means of spots. These spots are thickest in the areas of greatest density of population, and out of all reasonable proportion to the number of inhabitants or to the number of births occurring in these areas. They are thickest where the Lithuanians, Poles, Bohemians and Italian people are present in large numbers. They are thickest where the sanitary conditions are bad, where poverty and ignorance are most prevalent, where factories, in which many of the mothers or expectant mothers are employed, crowd close on the homes which harbor the young.

A study of the infant mortality statistics with relation to the nationality of mothers shows some startling conditions. Children of Lithuanian, Polish, Hungarian, Bohemian, Italian and Austrian mothers die in far greater ratio than do the children of mothers of other nationalities. The difference is clearly shown in Figure 4.

PREVENTIVE MEASURES

In Chicago, as in most other large American cities, the death-rates among children during the last two decades has been below that of the

preceding years, but, unfortunately, the rate of the last decade has not shown a decrease which is proportionate to that of the ten-year period preceding.

An analysis of the statistics of contagious diseases against which preventive measures have been applied with increasing vigor during the last ten years, is shown in condensed form in Figure 5.

We have progressed more in our fights against small-pox, malaria, diphtheria and typhoid than we have against the chief cause of infant mortality—the diarrheal diseases.

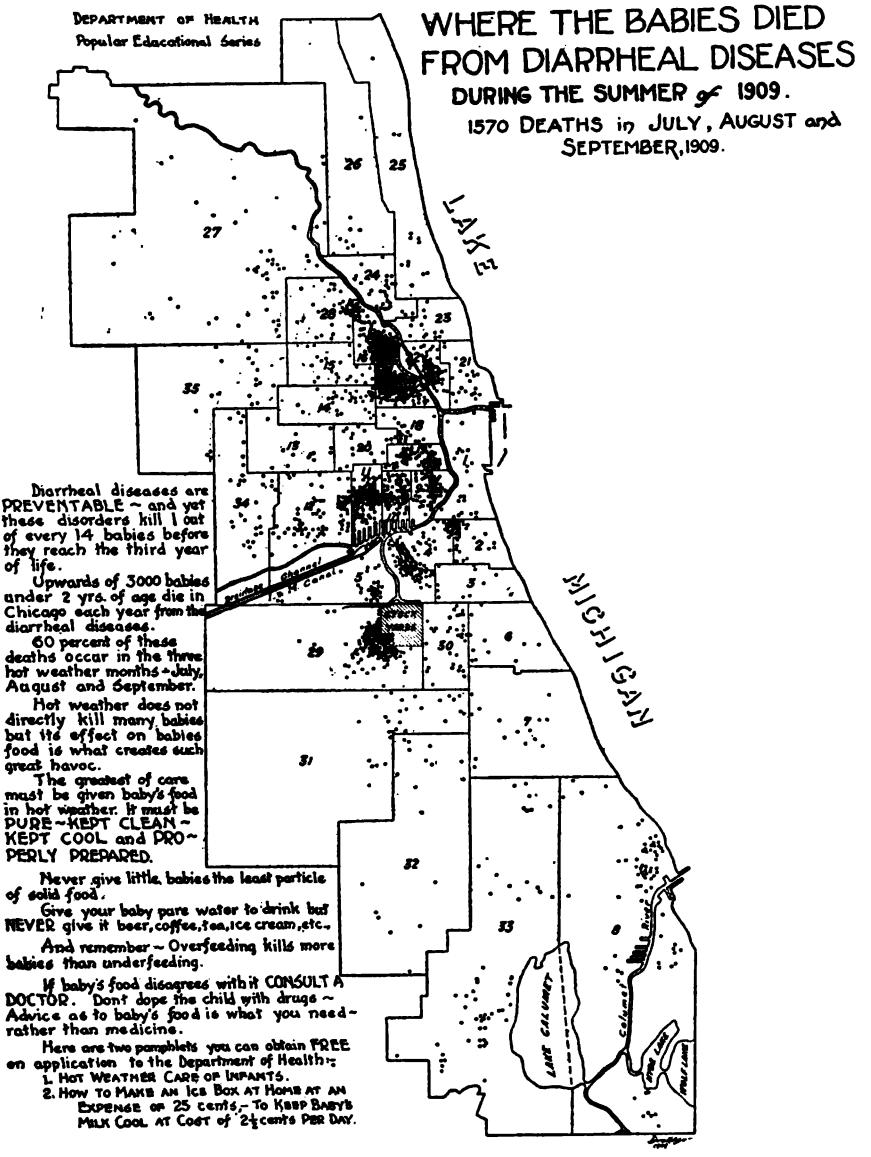
If we may count deaths from premature birth and injuries at birth as preventable—and surely a very large percentage of them are—there would be marked increases to show on the debit side of this sanitary ledger.

MILK AS A FACTOR

The general improvement of the market milk-supply, which began fifteen or twenty years ago, was followed by some slight lowering of the diarrheal disease deaths, not by any decided decrease. But the general improvement in market milk does not give us a milk-supply suitable for young infants, this being proved by the average bacterial count of all large cities, taken from the Hygienic Laboratory Bulletin, No. 56, and given in Table 4.

TABLE 4.—AVERAGE BACTERIAL COUNT OF MARKET MILK IN VARIOUS LARGE CITIES

City	Investigated by	Samples	Date	Count
Amsterdam	Von Geuns	..	1885	10,545
Würzburg	Clauss	8	1889	1,000,000 to 2,000,000
Würzburg	Hohenkamp	..	1889	1,900,000 to 7,200,000
Munich	Cnof	..	1889	200,000 to 6,000,000
Halle	Renk	..	1891	6,000,000 to 30,700,000
Giessen	Uhl	30	1892	83,000 to 169,600,000
Boston	Sedgwick & Batchelder	50	1892	708,000 to 4,200,000
Dorpat	Knochenstiern	..	1893	10,200,000 to 30,000,000
London	Rowland	25	1895	500,000
Buffalo	Frye	15	1896	25,000 to 43,600,000
London	Pakes	..	1900	3,000,000 to 4,000,000
New York City	Parke	..	1901	300,000 to 5,000,000
Middleton, Conn.	Burrage	..	1901	11,000 to 300,000
Rochester, N. Y.	Goler	86	1903	837,000 to 5,000,000
London	Dodd	..	1904	4,800,000
Philadelphia	Byrnes	..	1904	1,600 to 21,000,000
Chicago	Jordan	..	1904	16 per cent. samples contained over 20,000,000
Philadelphia	Bergey	..	1904	Average 4,800,000
Berlin	Proskauer, Seligmann, Croner	..	1907	Average 3,500,000
Washington	Hygienic Laboratory	..	1906	Average 22,134,000
Washington	Hygienic Laboratory	..	1907	Average 11,270,000
Chicago	Tonney (Raw Milk)	639	1909	Average 3,239,000
Chicago	Tonney (Past. Milk)	..	1909	Average 752,975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Popular Educational Series
WHERE THE BABIES DIED FROM DIARRHEAL DISEASES
DURING THE SUMMER of 1909.
1570 DEATHS in JULY, AUGUST and SEPTEMBER, 1909.
LAKE
MICHIGAN
Diarrheal diseases are PREVENTABLE ~ and yet these disorders kill 1 out of every 14 babies before they reach the third year of life.
Upwards of 3000 babies under 2 yrs. of age die in Chicago each year from the diarrheal diseases.
60 percent of these deaths occur in the three hot weather months ~ July, August and September.
Hot weather does not directly kill many babies but its effect on babies food is what creates such great havoc.
The greatest of care must be given baby's food in hot weather. It must be PURE ~ KEPT CLEAN ~ KEPT COOL and PROPERLY PREPARED.
Never give little babies the least particle of solid food.
Give your baby pure water to drink but NEVER give it beer, coffee, tea, ice cream, etc.
And remember ~ Overfeeding kills more babies than underfeeding.
If baby's food disagrees with it CONSULT A DOCTOR. Dont dope the child with drugs ~ Advice as to baby's food is what you need ~ rather than medicine.
Here are two pamphlets you can obtain FREE on application to the Department of Health:
1. HOT WEATHER CARE OF INFANTS.
2. HOW TO MAKE AN ICE BOX AT HOME AT AN EXPENSE OF 25 cents. ~ TO KEEP BABY'S MILK COOL AT COST of 2½ cents PER DAY.

Fig. 3.—Outline ward map of Chicago, showing location of infants' deaths.

That a further reduction in the bacterial content will result in a lowering of infant mortality can be seen from (1) the statistics of infant mortality in New York before and after the establishment of the Straus milk stations; (2) from the mortality at the infant asylum at Randall's Island before and after the use of pasteurized milk; (3) the lowering of infant mortality in Chicago after the pasteurization of 60 per cent. of the market milk, and (4) comparison of infant mortality statistics in cities with good and ordinary milk-supply.

Infant Mortality in New York City.—Pasteurized milk was first made available for infants in general in New York City in 1893, in which year Nathan Straus dispensed 34,400 bottles of milk so prepared from one depot. In 1894, 339,494 bottles were issued, in 1895, 666,622, and in 1896, 666,941. In 1905, 2,668,397 bottles were dispensed and 1,016,731 glasses of pasteurized milk were bought at the booths in the parks of New York City. In 1906, seventeen Straus stations dispensed 3,142,252 bottles of pasteurized milk and 1,078,405 glasses. Prior to the beginning of this work the death-rate of children under 5 years in New York City was over 96.2 out of every thousand, and in June, July and August the death-rate of children was at the rate of 136.4 per thousand per annum. With the increased use of pasteurized milk the death-rate fell to 55 per thousand in 1906, and the summer death-rate to 62.7 per thousand.

The Mortality at the Infant Asylum at Randall's Island.—When the infants in the care of the City of New York were fed on milk from a carefully selected herd pastured on the island, the death-rate was as shown in the first part of Table 5. A pasteurizing plant was installed in the early part of 1898. No other change in diet or hygiene was made.

TABLE 5.—DEATH-RATE AT THE INFANT ASYLUM, RANDALL'S ISLAND

	Children treated	No. of Deaths	Percentage
Before the Use of Pasteurized Milk			
1895	1,216	511	42.02
1896	1,212	474	39.11
1897	1,181	524	44.36
Total	3,609	1,509	41.81
After the Use of Pasteurized Milk			
1898	1,284	255	19.80
1899	1,097	269	24.52
1900	1,084	300	27.68
1901	1,028	186	18.09
1902	820	181	22.07
1903	542	101	18.63
1904	345	57	16.52
Total	6,200	1,349	21.75

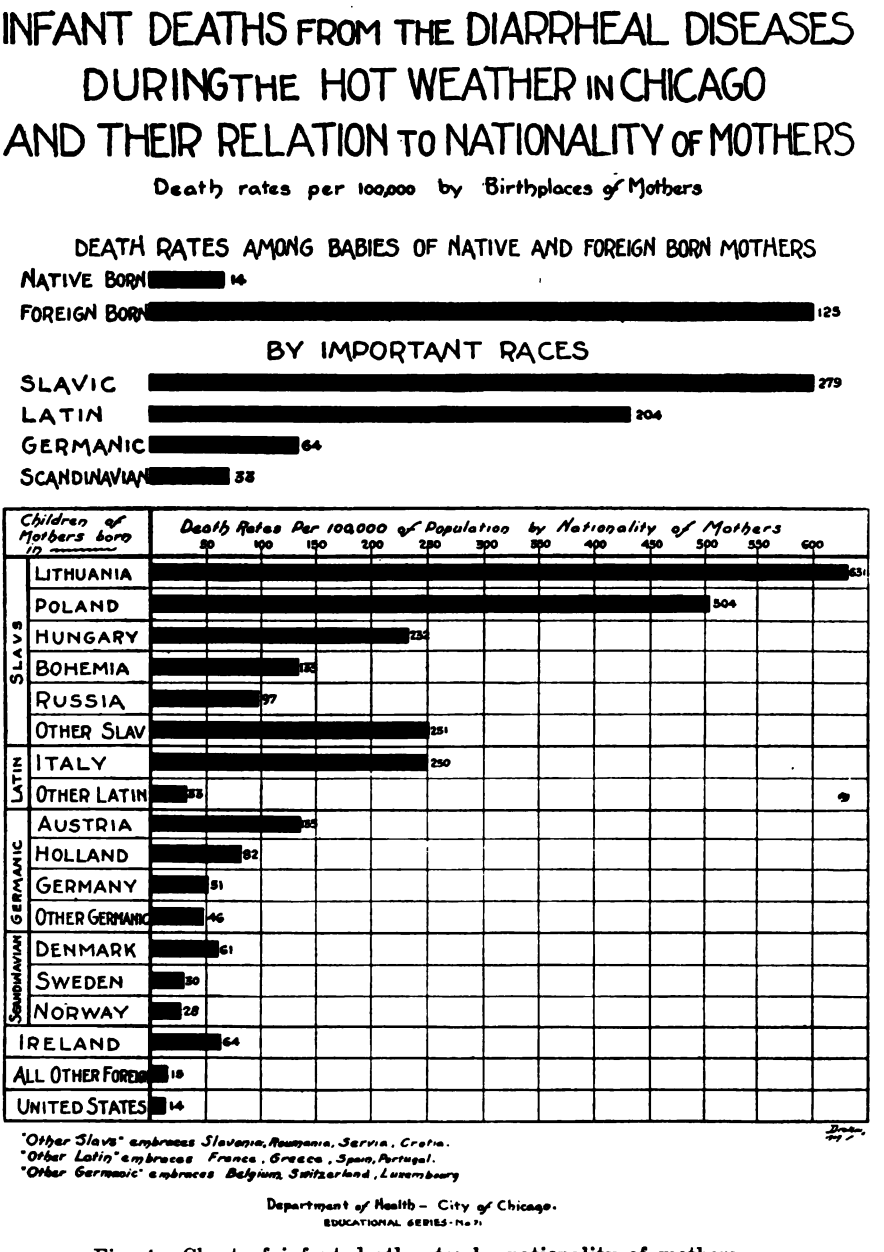
INFANT DEATHS FROM THE DIARRHEAL DISEASES DURING THE HOT WEATHER IN CHICAGO AND THEIR RELATION TO NATIONALITY OF MOTHERS
Death rates per 100,000 by Birthplaces of Mothers
DEATH RATES AMONG BABIES OF NATIVE AND FOREIGN BORN MOTHERS
NATIVE BORN 14
FOREIGN BORN 125
BY IMPORTANT RACES
SLAVIC 279
LATIN 204
GERMANIC 64
SCANDINAVIAN 38
Children of Mothers born in
Death Rates Per 100,000 of Population by Nationality of Mothers
50 100 150 200 250 300 350 400 450 500 550 600
SLAVS
LITHUANIA 651
POLAND 504
HUNGARY 234
BOHEMIA 183
RUSSIA 97
OTHER SLAV 251
LATIN
ITALY 250
OTHER LATIN 38
GERMANIC
AUSTRIA 185
HOLLAND 82
GERMANY 51
OTHER GERMANIC 46
SCANDINAVIAN
DENMARK 61
SWEDEN 30
NORWAY 28
IRELAND 64
ALL OTHER FOREIGN 18
UNITED STATES 14
"Other Slavs" embraces Slavonia, Roumania, Servia, Croatia.
"Other Latin" embraces France, Greece, Spain, Portugal.
"Other Germanic" embraces Belgium, Switzerland, Luxembourg
Department of Health – City of Chicago.
EDUCATIONAL SERIES - No 71

Fig. 4.—Chart of infant death-rates by nationality of mothers.

TABLE 6.—THE LOWERING OF INFANT MORTALITY IN CHICAGO AFTER PASTEURIZATION OF SIXTY PER CENT OF THE MARKET MILK SUPPLY IN 1909*

Years	Deaths	Rates per 100.000
1899	5,917	363
1900	5,726	337
1901	5,407	308
1902	5,514	303
1903	5,699	304
1904	5,387	279
1905	6,251	314
1906	6,554	319
1907	6,720	319
1908	6,908	319
Average 10 years	6,008	316
1909	6,389	287

* Prior to 1907 all deaths of children who lived less than one day were excluded from the mortality count. Since 1907 such deaths have been included and they constitute 7.2 per cent. of the total mortality under one year of age. Therefore, to make this statement comparable, 7.2 per cent. has been added to the tabulations of the years 1899 to 1906, inclusive.

Is it not significant that the only marked reduction in deaths in Chicago during the year 1909, as compared with the preceding year, was among the babies, the milk feeders? At all other ages, excepting 10 to 20 years, there were increases, as will be seen by Table 7.

TABLE 7.—AGES AT WHICH LIVES WERE SAVED DURING THE YEAR 1909

Years	Deaths 1909	Deaths 1908	Saving	Loss
Under 1	6,387	6,908	521	...
1 to 5	2,981	2,768	...	213
5 to 10	768	759	...	9
10 to 20	1,179	1,199	20	...
20 to 30	2,676	2,573	...	103
30 to 40	3,261	3,085	...	178
40 to 50	3,768	3,553	...	215
50 to 60	3,501	3,334	...	167
60 to 70	3,195	2,965	...	230
70 to 80	2,367	2,240	...	127
Over 80	1,158	1,150	...	8

TABLE 8.—COMPARISON OF INFANT MORTALITY STATISTICS IN CITIES WITH GOOD AND ORDINARY MARKET MILK-SUPPLY

GOOD MILK-SUPPLY (Pasteurized)

	1908	1909
Copenhagen	150	109
Buenos Aires	86	88
Paris	103	96

ORDINARY MILK SUPPLY

	1908	1909
London	113	108
New York	128	130
Berlin	168	158
Vienna	183	172
Chicago	135	125

SANITARY TRIAL BALANCE

THE CITY OF CHICAGO
IN ACCOUNT WITH
THE PREVENTABLE DISEASES

LOSSES AND GAINS DURING THE LAST TEN YEARS AS COMPARED WITH THE PRECEDING DECADE

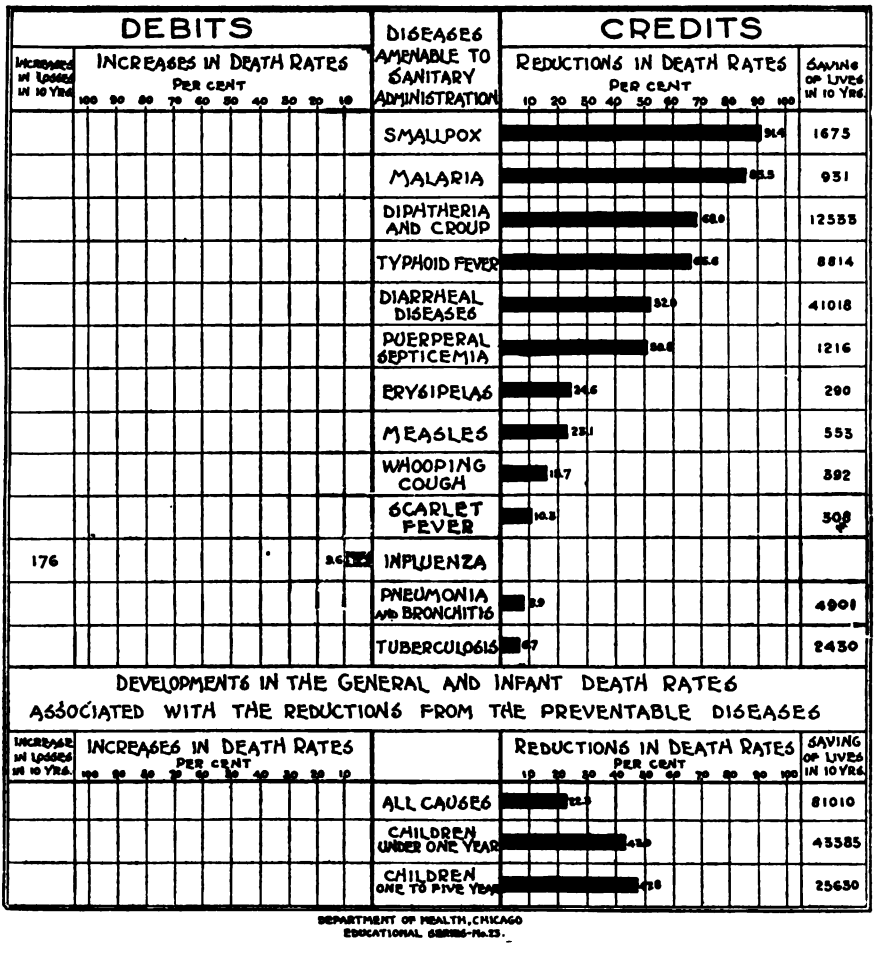
DEBITS
CREDITS
DISEASES AMENABLE TO SANITARY ADMINISTRATION
INCREASES IN LOSSES IN 10 YRS.
INCREASES IN DEATH RATES PER CENT
REDUCTIONS IN DEATH RATES PER CENT
SAVING OF LIVES IN 10 YRS.
SMALLPOX 91.4 1675
MALARIA 83.5 931
DIPHTHERIA AND CROUP 68.0 12535
TYPHOID FEVER 65.6 8814
DIARRHEAL DISEASES 52.0 41018
PUERPERAL SEPTICEMIA 50.6 1216
ERYSIPELAS 24.6 290
MEASLES 23.1 553
WHOOPING COUGH 16.7 392
SCARLET FEVER 10.3 508
176 INFLUENZA
PNEUMONIA AND BRONCHITIS 2.9 4901
TUBERCULOSIS 4.7 2450
DEVELOPMENTS IN THE GENERAL AND INFANT DEATH RATES ASSOCIATED WITH THE REDUCTIONS FROM THE PREVENTABLE DISEASES
INCREASE IN LOSSES IN 10 YRS.
INCREASES IN DEATH RATES PER CENT
REDUCTIONS IN DEATH RATES PER CENT
SAVING OF LIVES IN 10 YRS.
ALL CAUSES 22.3 81010
CHILDREN UNDER ONE YEAR 43.9 43585
CHILDREN ONE TO FIVE YEARS 37.8 25630
DEPARTMENT OF HEALTH, CHICAGO
EDUCATIONAL SERIES-No. 23.

Fig. 5.—Chart of increase and reduction in death-rates from various diseases.

There are other significant factors besides the milk-supply to be taken into consideration:

In American cities the change in the immigrant population during the last two decades is an important factor. The change is illustrated by Table 9.

TABLE 9.—RECENT CHANGES IN THE RACE OF IMMIGRANTS: COMPARISON OF CERTAIN NATIONAL GROUPS*

	Per cent. of Immigrants from Austria-Hungary, Italy and Russia in Total Immigration.†	Per cent. of Immigrants from United Kingdom, France, Germany and Scotland in Total Immigration.
1869	0.9	73.8
1880	8.5	64.5
1890	34.0	57.7
1891	39.6	52.1
1892	44.8	53.0
1893	42.7	48.2
1894	42.6	47.9
1895	39.8	52.9
1896	53.9	38.5
1897	53.0	37.6
1898	57.9	33.3
1899	64.4	27.8
1900	66.7	25.3
1901	68.6	22.5
1902	70.6	20.3
1903	66.8	22.4
1904	63.4	25.0
1905	66.4	24.2
1906	68.5	18.3
1907	71.3	17.1

* Prepared by Immigration Restriction League from Quarterly Report of Bureau of Statistics, No. 2, Series 1892-1893, and Reports of Commissioner-General of Immigration.
† Includes Poland to 1898.

Thirty years ago the immigrant or foreign population of cities consisted of Germans, Scandinavians, English or Irish. Now the Slavs and those from southern European countries are in excess. They come from the European countries which have the highest infant mortality rates, and with the change in environment and industrial states of both sexes, conditions result which favor high infant mortality.

That the changed industrial conditions are an important factor has been shown by Devine in his studies of the mortality rates in two manufacturing cities in Massachusetts, compared with other American cities.

The statistics of families studied for Dr. Hamilton by Theresa McMahon, Ph.D., (Table 10) show the percentage of children dying in families of working women.

TABLE 10.—RELATION OF NUMBER OF WORKING WOMEN TO CHILDREN'S DEATHS IN 600 FAMILIES IN CHICAGO

	Women worked after marriage	Women worked before marriage	Women worked before and after marriage
Number of women	114	307	88
No. of children who died	200	504	150
Per cent. of children who died prematurely and at birth	39	33	36
Per cent. of children who died under 3 years	56	61	60
Per cent. of children who died over 3 years	4	5	4

As an example of the opposite condition may be cited the death-rate during the siege of Paris, in 1870-71, where, with the cessation of industrial activities in the city, the infant mortality fell 40 per cent., while the general mortality rate is said to have doubled.

In 1880 according to the Census Bureau, 25.8 per cent. of the entire population lived in the cities. Since that time the urban population has been increasing rapidly. In 1890 it constituted 32.9 per cent. of the total population; in 1900, 37.3 per cent., and now it is estimated that fully 41 per cent. of the inhabitants of the United States live in the cities of more than 4,000 population. This same tendency prevailed in the later days of the Roman Empire and was an important element contributing to its decline and fall.

The effects of such migration always have manifested themselves by a high infant mortality. Newman, after a study of infant mortality in Great Britain, concludes that the distribution of infant mortality follows mainly in the wake of urbanization—that is, high density of population —combined with industrial and social conditions.

Of the many other factors influencing infant mortality and which may bear on the results of preventive measures, excessive child-bearing may be briefly considered. Alice Hamilton reported at the New Haven meeting on investigations made in Chicago, and concludes that excessive child-bearing makes for excessive child mortality. Table 11, taken from her report, shows that the increase in size of the families is paralleled by the increase in the proportion of children lost.

TABLE 11.—INFANT DEATHS PER THOUSAND BIRTHS

Families of 4 children and less	118
Families of 6 children and more	267
Families of 7 children and more	280
Families of 8 children and more	291
Families of 9 children and more	303

Table 12, compiled from her report, shows the relation of nationality, child-bearing and infant mortality rate.

TABLE 12.—INFANT DEATHS PER THOUSAND IN RELATION TO NATIONALITY AND CHILD-BEARING

	Group 1 8 child. & more	Group 2 4 child. & less	Av. No. Children per family	Av. No. Deaths per family
Jews	260	81	5.7	1.1
Mixed	271	98	5.1	1.0
Irish	291	113	6.6	1.7
German	288	186	5.7	1.3
Slavs	328	122	6.5	1.7
Italians	391	125	6.6	1.9

The high birth-rate and death-rate here shown among the Slavs and Italians is closely related to the deaths occurring from accidents at birth, and from prematurity. Tallent states that midwives attend 47 per cent. of all cases in Chicago, and 86 per cent. among the Italian population. Accurate data on this question cannot be obtained from birth certificates, because complete returns are not made; but from a study of the 485 names of midwives practicing in Chicago, it is found that 35 per cent. are Slavish and 6 per cent. are Italian. The prevailing custom is that they practice, each among her own nationality.

PREVENTIVE MEASURES SUGGESTED

The measures which we suggest and briefly summarize, are made with a view of remedying the existing direct and indirect causes of sickness and death in children, as shown by the study presented.

1. *Causes Operating Directly on the Mother.*—The causative conditions that need correction are neglected education, new environment, urbanization, female employment, improper care during pregnancy, and later, neglected breast-feeding, overwork, bad health, alcoholism and poverty.

It is not easy to suggest a remedy for all of these. Some of these influences can and will be eliminated by proper enactment and enforcement of laws. The personal factor can be treated only by educational measures. Such measures promulgated in the public schools will have their effect in time. The present generation is much more difficult to reach. The procedure now followed in European countries is yielding results. For a detailed summary of these methods and work, embodied in the Infant Welfare Movement, I refer to Abt's article.[1]

1. Abt, Isaac A.: A Survey of the International Movement Concerning Infant Welfare, Illinois Med. Jour., April, 1910, p. 428.

Starting in 1892, with Budin's consultation for nurslings whose mothers were delivered in his clinic, the movement has progressed and with the recent building of the Augusta Victoria House at Charlottenburg, near Berlin, the work in Germany has assumed a national aspect.

The English method, as practiced by the Westminster Health Society of visiting mothers, is extremely practical. Voluntary lady visitors who have received some training call on the mothers in their localities, often before the baby is born, and after birth make calls as frequently as it seems necessary.

The calling on cases of reported sickness sometimes practiced in American cities does not strike at the root of the evil, yet it is better than inactivity. The baby-tent idea, used effectively in Chicago, has served in manifold ways to aid mothers in the care of sick and well children.

2. *Causes Operating Directly and Indirectly on the Child.*—Causative and contributory existing conditions that require correction are: incomplete birth registration, improper care, no reports of morbidity.

It is impossible to apply a remedy if it is not known where the trouble exists. If the well or sick children are to be visited and taken care of, their location has to be determined. Births should be reported within twenty-four hours. Following this, advice should be given the mother in regard to the proper care and feeding of the child. Breast-feeding should be encouraged. Budin's experience has shown how much more generally it can be carried out when efforts are made to do so.

Leaflets, mailed to the mother on receipt of the birth report, are useful; but the best results are obtained by personal supervision. The obstetrician or midwife makes the initial call in practically all births, and in the absence of other agencies it becomes their duty to not only attend to the birth and puerperium, but also to see that the child is properly started in life. Midwives with their practice limited by law to obstetrics are in need of enlightenment with regard to their duties to humanity. When this is properly presented to them and it is shown of what great service judicious advice given by them to the mother will mean for the welfare of the child, they may be made influential agencies in the prevention of infant mortality. In Chicago a correspondence school for midwives is conducted by the Health Department with gratifying results.

Hedger, reporting on the work done in Chicago during the summer of 1909, says that 17,437 families were called on, and 2,876 sick children

were found; 2,057 had diarrhea and 800 had other affections. Infantile diarrhea should be made a reportable disease.

3. *Indirect Causes to be Remedied by Action on the Part of the Authorities.*—The baneful influences of bad sanitation, improper housing, congestion in cities, filthy environment, flies, bad water and an unclean milk-supply are factors in the cause of disease and death of children, as well as of adults, that require correction wherever they exist.

Since the diseases due to impure milk and bad air make up the first and third largest groups of causes of death in infancy, it behooves us to eliminate these influences to the fullest extent. High-grade, clean milk may be had in most cities, but the price is prohibitive, as far as the poor are concerned. Infants' milk depots have been established and are distributing milk specially adapted in regard to purity and chemical composition, to infants' feeding. Unfortunately, babies are too frequently supplied with milk from those sources only after sickness or nutritional disturbances have developed, and even then such milk stations are not within the reach of all. Milk-dealers who can make deliveries throughout the entire city should come to the aid of the philanthropic organizations which are now carrying on this work.

In addition, the general market milk-supply should be improved so that those who must rely on this source in the feeding of infants and children, may not be unnecessarily exposed to infection. All milk not produced in accordance with strict sanitary requirements should be properly pasteurized under municipal control.

Pure water should be supplied for children in the hot season. This is mentioned to emphasize the findings of Hedger and others, namely, that many children are given food and food only when they are crying of thirst.

Air, the first requirement of the child at birth, should be pure. The curative powers of pure air in pulmonary diseases, marasmus, rickets, summer diarrhea, and its soothing effect on the crying and restless child, have been recognized more and more of late, and necessarily we must draw the conclusion that if pure air is beneficial for the sick it must be equally good for the well.

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DISCUSSION ON THE SANITARY OUT-HOUSE

Dr. Charles W. Stiles, Washington, D. C., exhibited some models of privies, such as have been illustrated in his articles issued by the government.

DR. CHARLES W. STILES, Washington, D. C.: The average privy in the country districts is ventilated between the boards and every other way, is open in the back, and is not over an excavation. From it there is bound to be a spread of the various soil pollution diseases: typhoid fever, amebic dysentery, bacillary dysentery, hookworm disease, etc. It is the exception that I find a privy of a better type than that on the farms. It is my belief that I do not usually find, medically speaking, a better type of privy in the suburbs of cities; although, from the standpoint of construction, the suburbs usually have a much better type. One can readily see how disease can spread from such a structure.

After studying the matter from several points of view, I have prepared a design for a sanitary privy. It must be private, must prevent the spread of disease, and must be cheap. My design can be built, so far as the material is concerned, for from $5 to $10, the cost varying according to the price of material in different localities. It is closed in the back, and underneath is a water-tight pail, tub or barrel. There should be cleats, so that that pail will always center; and it is best to have the top of the pail come snugly up to the seat. By using a fluid disinfectant, or simply water, with a cup of kerosene oil on top of it, the flies can be kept away from the excreta. If a fluid is used, the pail must be deep enough to protect from splashing.

One of the great problems of the outhouse is to make the privy as little disagreeable as possible. One reason why people avoid the privy in hot climates is that it is a disagreeable place. To overcome that point I have put in five ventilators. The door should close of its own accord, with a spring. Most house privies have from two to four seats. I see no advantage in that; and the expense can be reduced

by having a single seat. There should be a lid to the seat, so arranged that as soon as a person rises the seat will fall of its own accord. For children, a separate smaller seat can be used, shoved into place according to necessity.

This privy is protected against flies in various ways: first, by the screens, by the automatically closing door and cover-lid, by a tight door in the rear and by the use of a fluid disinfectant. The fly protection can be carried one point further by painting the privy dark. Flies are attracted by light colors, mosquitoes by dark colors; but I think the flies are amply guarded against by the ventilation, the fluid in the pail, the screens, the automatically closing doors, and the rear door (for removal of pail) falling down so that it has to be raised.

The Public Health and Marine-Hospital Service issues a reprint giving the carpenter's estimate for the lumber, showing the lumber sawed up into the proper shapes, and giving full instructions from beginning to end, so that any schoolboy of 12 or 14 years of age can construct a sanitary privy for his home. Recently I have induced some of the schools in the South to introduce the sanitary privy as one of the regular objects to be constructed in the manual-training classes. They can just as well build a privy as anything else.

Dr. J. N. Hurty, Indianapolis: I hope that the papers of the land will soon—say within the next year or two—commence to appreciate the work of sanitarians. As we know, there are 2,000,000 people in the South rendered inefficient, made burdens on the states in which they live, and all because of a preventable disease. When first pointed out by Dr. Stiles, his first reward was ridicule. I don't know that the papers have gotten over ridiculing it yet; I would not be surprised to find that they are still making fun of this great discovery of the cause of so much misery, so much inefficiency, so much sickness and so much shortening of life; but let us hope that they will get hold of the idea presently. This is not a savory or beautiful subject, but it is very important.

Dr. Charles W. Stiles, Washington, D. C. [Replying to questions asked by several members]: As to the destruction of infection by disinfectants, sufficient studies have not yet been made. Any thing which will keep oxygen from the hookworm eggs acts toward destroying them. At the same time, we must recall that in the dry-earth system the night soil is not sufficiently covered with dirt, and we cannot get people to keep them covered. I am coming to the view that a fluid

disinfectant, if only water and kerosene oil, is perhaps after all the safest; but that point is still *sub judice*.

As for the final disposition of the night soil, any farmer can put a pail like that on two stones, make a fire under it and thoroughly disinfect the foul material. If two pails are provided instead of one, one pail may be utilized for a week and then be set aside to ferment; this is an additional safeguard against the spread of disease, because fermentation breaks up the fecal material entirely, and the ova are so destroyed.

I recommend a privy raised from the ground to avoid rats. A privy which is built down to the ground all the way around provides a breeding place for rats. This is avoided by the opening under the floor.

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